

Customer No. 20350

TOWNSEND and TOWNSEND and CREW LLP
Two Embarcadero Center, 8th Floor
San Francisco, California 94111-3834
(415) 576-0200

ASSISTANT COMMISSIONER FOR PATENTS
BOX PATENT APPLICATION
Washington, D.C. 20231

Attorney Docket No. 18696-000130US

"Express Mail" Label No. EL378165840US

Date of Deposit: November 3, 1999

I hereby certify that this is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above, addressed to:

Assistant Commissioner for Patents
Washington, D.C. 20231

By:

Sunil Dutt

Sir:
Submitted herewith for filing under 37 CFR 1.53(b) is the
[X] continuation patent application

Inventor(s)/Applicant Identifier: Kenneth P. Lanahan, Thomas G. Durham, Stephen C. Foreman

For: AN IMPROVED SYNTHETIC PANEL AND METHOD

[X] This application claims priority from each of the following Application Nos./filing dates:
Serial No. 09/322,268, filed May 28, 1999. Copending patent application Serial No. 09/322,268 was a continuation patent application of patent application having Serial No. 09/003,747, filed Jan. 7, 1998, now U.S. Patent No. 5,943,775. Patent application having Serial No. 09/003,747 was a continuation-in-part of patent application having Serial No. 08/556,265, filed Nov. 13, 1995, now U.S. Patent No. 5,842,276.

[X] Please amend this application by adding the following before the first sentence: "This is a continuation patent application of copending patent application having Serial No. 09/322,268, filed May 28, 1999. Copending patent application Serial No. 09/322,268 was a continuation patent application of patent application having Serial No. 09/003,747, filed Jan. 7, 1998, now U.S. Patent No. 5,943,775. Patent application having Serial No. 09/003,747 was a continuation-in-part of patent application having Serial No. 08/556,265, filed Nov. 13, 1995, now U.S. Patent No. 5,842,276. Benefit of all earlier filing dates is hereby claimed with respect to all common subject matter.

Enclosed are:

- [X] 59 page(s) of specification
[X] 16 page(s) of claims
[X] 1 page of Abstract
[X] 26 sheet(s) of [] formal [X] informal drawing(s).
[X] An assignment of the invention to QB TECHNOLOGY (as previously filed)
[X] A [X] signed [] unsigned Declaration & Power of Attorney (as previously filed)
[X] A verified statement to establish small entity status under 37 CFR 1.9 and 37 CFR 1.27 [X] is enclosed (was filed in the prior application and small entity status is still proper and desired).
[X] Information Disclosure Statement under 37 CFR 1.97 with references.
[X] Preliminary Amendment
[X] Ten(10) sheets of corrected drawings marked in red ink]

	(Col. 1)	(Col. 2)	
FOR:	NO. FILED	NO. EXTRA	
BASIC FEE			
TOTAL CLAIMS	147 - 20	= *127	
INDEP. CLAIMS	15 - 3	= *12	
[] MULTIPLE DEPENDENT CLAIM PRESENTED			

* If the difference in Col. 1 is less than 0, enter "0" in Col. 2.

SMALL ENTITY	
RATE	FEE
	\$380.00
x \$9.00 =	\$1,143.00
x \$39.00 =	\$468.00
+ \$130.00 =	
TOTAL	\$1,991.00

OTHER THAN SMALL ENTITY	
RATE	FEE
	\$760.00
x \$18.00 =	
x \$78.00 =	
+ \$260.00 =	
TOTAL	

Please charge Deposit Account No. 20-1430 as follows:

- [X] Filing fee \$ 1,991.00
[X] Any additional fees associated with this paper or during the pendency of this application.
[] The issue fee set in 37 CFR 1.18 at or before mailing of the Notice of Allowance, pursuant to 37 CFR 1.311(b)


[] A check for \$_____ is enclosed.
2 extra copies of this sheet are enclosed.

Telephone:
(415) 576-0200

Facsimile:
(415) 576-0300

SF 1040485 v1

Respectfully submitted,
TOWNSEND and TOWNSEND and CREW LLP



John Carpenter
Reg No.: 26,447
Attorneys for Applicant

Atty. Docket No.

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(d) & 1.27(c)) - SMALL BUSINESS CONCERN

Applicant or Patentee: KENNETH P. LANAHAN

Application or Patent No.: _____

Filed or Issued: _____

Title: AN IMPROVED SYNTHETIC PANEL AND METHOD

I hereby declare that I am:

- ☐ the owner of the small business concern identified below:
☒ an official of the small business concern empowered to act on behalf of the concern identified below:

Name of Small Business Concern: E.A. COLLINSAddress of Small Business Concern: 7448 W SAHARALAS VEGAS, NV 89117

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.12, and reproduced in 37 CFR 1.9(d), for purposes of paying reduced fees to the United States Patent and Trademark Office, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled by inventor(s) described in:

- ☒ the specification filed herewith.
☐ Application No. _____, filed _____
☐ Patent No. _____, issued _____

If the rights held by the above-identified small business concern are not exclusive, each individual, concern or organization having rights in the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern that would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e).

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention availing to their status as small entities. (37 CFR 1.27)

Name _____
 Address _____

☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

Name _____
 Address _____

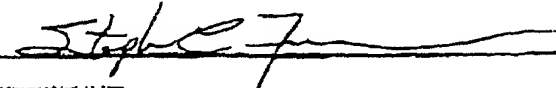
☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Name of Person Signing: Stephen C. ForemanTitle of Person if Other than Owner: ManagerAddress of Person Signing: 7448 W. SaharaLAS VEGAS, NV 89117

Signature



Date

1/7/98

Any. Docket No. 18696-000110

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY
STATUS (37 CFR 1.9(f) and 1.27(b)) - INDEPENDENT INVENTOR**Applicant or Patentee: KENNETH P. LANAHAN

Application or Patent No.: _____

Filed or Issued: _____

Title: AN IMPROVED SYNTHETIC PANEL AND METHOD

As a below named inventor, I hereby declare that I qualify as an independent inventor as defined in 37 CFR 1.9(c) for purposes of paying reduced fees to the Patent and Trademark Office regarding the invention entitled _____

described in:

☒ the specification filed herewith.☐ Application No. _____, filed _____☐ Patent No. _____, issued _____

I have not assigned, granted, conveyed or licensed and am under no obligation under contract or law to assign, grant, convey or license, any rights in the invention to any person who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person had made the invention, or to any concern which would not qualify as a small business concern under 37 CFR 1.9(d) or a nonprofit organization under 37 CFR 1.9(e).

Each person, concern or organization to which I have assigned, granted, conveyed, or licensed or am under an obligation under contract or law to assign, grant, convey or license any rights in the invention is listed below:"


☐ No such person, concern, or organization☒ Persons, concerns or organizations listed below"

*NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

Name QB TECHNOLOGY L.C.Address 118 S.W. 2nd AvenueAva, MO 65608☐ Individual☒ Small Business Concern☐ Nonprofit OrganizationName E A COLLINSAddress 7448 W SAHARALAS VEGAS, NV 89117☒ Individual☐ Small Business Concern☐ Nonprofit Organization

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b)).

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

Name of Inventor: <u>KENNETH P. LANAHAN</u>	Name of Inventor:	Name of Inventor:
 Signature of Inventor	Signature of Inventor	Signature of Inventor
Date <u>1-7-98</u>	Date:	Date:

**VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
(37 CFR 1.900 & 1.27(c)) - SMALL BUSINESS CONCERN**

Title: AN IMPROVED SYNTHETIC PANEL AND METHOD

☐ the owner of the small business concern identified below:

☒ an official of the small business concern empowered to act on behalf of the concern identified below:

Aya MO 65608

☒ the specification filed herewith.
☐ Application No. _____, filed _____
☐ Patent No. _____, issued _____

☐ Individual ☐ Small Business Concern ☐ Nonprofit Organization

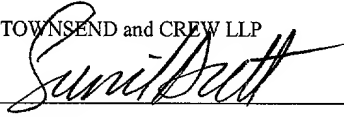
Date 1-7-98

I hereby certify that this correspondence is being deposited with the United States Postal Service Expressmail # EL378165840US in an envelope addressed to:

PATENT
Attorney Docket No.: 18696-0001-3US

Assistant Commissioner for Patents
Washington, D.C. 20231

On November 3, 1999

TOWNSEND and TOWNSEND and CREW LLP
By: 
Sunil Dutt

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

LANAHAN ET AL

Application No.: Not Assigned

Filed:

For: SYNTHETIC PANEL AND
METHOD

Art Unit: 3726

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination of the above-referenced application, please enter the following amendments and remarks.

IN THE DRAWINGS:

Ten (10) sheets of drawings including Figs. 1, 6, 9, 10, 11, 15, 16, 19, 20, 20A, 20B, 21, 22, and 33 are enclosed with red-ink corrections. Approval by the Examiner is respectfully requested.

IN THE SPECIFICATION:

Page 1, line 1, after the title: "**AN IMPROVED SYNTHETIC PANEL AND METHOD**" insert -- This is a continuation patent application of copending patent application having Serial No. 09/322,268, filed May 28, 1999. Copending patent application Serial No. 09/322,268 was a continuation patent application of patent application having Serial No. 09/003,747, filed Jan. 7, 1998, now U.S. Patent No. 5,943,775. Patent application having Serial No. 09/003,747 was a continuation-in-part of patent application having Serial No. 08/556,265, filed Nov. 13, 1995, now U.S. Patent No. 5,842,276. Benefit of all earlier filing dates is hereby claimed with respect to all common subject matter.

Page 31, line 9, after "12." insert --The polymeric foamed material 12 has a pair of opposed ends 12f and 12g (see Figs. 6, 9 and 10).--

Page 32, line 5, delete "The" and substitute therefor --As best shown in Figs. 20, 21 and 22, the--.

Page 32, line 6, after "30r₁" insert --having opposed cut surfaces 30r_{1c}-30r_{1c} terminating in the opposed ends 12f and 12g--.

Page 32, line 7, delete "30_s" and substitute therefor --30s--.

Page 32, line 8, after "30r₂" insert --respectively having opposed cut surfaces 30w_c-30w_c, 30f_c-30f_c and 30r_{2c}-30r_{2c}--.

Page 32, line 10, after "12r" insert --having cut surface 12r_c--.

Page 32, line 14, delete "access" and substitute therefor --recess--.

Page 32, line 14, after "12r" insert --and respectively against cut surfaces 30r_{1c}-30r_{1c}, and cut surface 12r_c--.

Page 32, line 16, after "30w" insert --and against cut surfaces 30w_c-30w_c--.

Page 32, line 17, after "30f" insert --and against cut surfaces 30f_c-30f_c, --.

Page 32, line 17, after "30r₂" insert --and against cut surfaces 30r_{2c}-30r_{2c}, --.

Page 32, line 17, after "30s." insert --As further best shown in Figs. 20, 20A and 20B, there is seen a cut surface, generally illustrated as 12cs and including cut surface 12cs₁ (e.g., a defined planar surface 12cs₁) and cut surface 12cs₂ (e.g., a defined planar surface 12cs₂). As best shown in Fig. 20A, web 14f of brace member 14 is generally aligned with cut surface 12cs, more specifically with cut surfaces 12cs₁ and 12cs₂. As will be further indicated hereinafter, if a hot wire (identified as "58" below) is used as a cutter for cutting or forming slot(s) 30 including the associated cut surfaces (e.g., 30w_c-30w_c, 30f_c-30f_c, 30r_{2c}-30r_{2c}, etc.), the cut surface(s) are seared surfaces.--

Page 32, line 31, after "12c." insert --Each of the polymeric foamed materials 12a and 12b respectively include the following as best shown in Fig. 20B: cut surface 12cs including cut surfaces 12cs₁ and 12cs₂; slot section 30r₁ having opposed cut surfaces 30r_{1c}-30r_{1c}; polymeric material recess 12r including cut surface 12r_c; slot section 30w comprising opposed cut surfaces 30w_c-30w_c; slot section 30f including opposed cut surfaces 30f_c-30f_c; and slot section 30r₂ having opposed cut surfaces 30r_{2c}-30r_{2c}--.

Page 42, line 18, after "12" insert --such as to terminate in the pair of opposed ends 12f and 12g of polymeric foamed material 12 (see Figs. 10 and 19).--

Page 42, line 19, delete 9 and substitute therefor --10--.

Page 44, line 34, after "ends" insert --12f and 12g--.

Page 45, line 36, before "see" insert --i.e. a surface or a side surface or a defined surface or a defined side surface.--.

Page 46, line 17, after "15." insert --Thus, and as best shown in Fig. 19, between the formation of two particular adjacent slots 30, the polymeric foamed material opening 15 (including slot 70) was cut; and between the formation of the left extreme slot 30 and right extreme slot 30 in Fig. 19 (or the two opposed slots 30 respectively adjacent to channel 26 and tongue 24 in Fig. 19) the polymeric material opening 15 (including slot 70) along with a slot 30 (i.e. the slot 30 between the left extreme slot 30 and the right extreme slot 30) was cut or formed.--

Page 50, line 14, after "cutters." insert --If hot wires 58 are used as cutters for forming respective slots 30, the walls or cut surfaces (i.e. cut surfaces 30w_c, 30f_c and 30r_{1c}) would be seared surfaces.--

Page 50, line 28, delete "4" and substitute therefor --the--.

Page 53, line 35, delete "125" and substitute therefor --12s--.

Page 53, line 36, after "Fig. 20" insert --, including opposed cut surfaces 30r_{1c}-30r_{1c}--

Page 54, line 3, after "Fig. 20" insert --, including opposed cut surfaces 30w_c-30w_c--

Page 54, line 7, after "Fig. 20" insert --, including cut surface 12r_c--.

Page 54, line 11, after "Fig. 20" insert --, including opposed cut surfaces 30w_c-30w_c--

Page 54, line 14, after "30r₁" insert --including opposed cut surfaces 30r_{1c}-30r_{1c} --.

Page 54, line 15, after "30s" insert --including opposed cut surfaces 30s_c-30s_c--.

Page 54, line 16, after "12r" insert --including cut surfaces 12r_c--.

Page 54, line 27, after "30r₁" insert --and against opposed cut surfaces 30r_{1c} and 30r_{1c}--

Page 54, line 28, after "12r" insert --and against cut surface 12r--

Page 54, line 32, after "30s" insert --and against opposed cut surfaces 30w_c and 30w_c--.

Page 55, line 21, after "Fig. 20" insert --, and respectively including opposed cut surfaces 30w_c and 30w_c and/or including opposed cut surfaces 30r_{1c} and 30r_{1c}--

Page 55, line 35, after "Fig. 20" insert --including opposed cut surfaces 30r_{1c} and 30r_{1c}--.

Page 56, line 5, after "Fig. 20" insert --, including opposed cut surfaces 30w_c and 30w_c--.

Page 56, line 12, after "Fig. 20" insert --, and respectively including opposed cut surfaces 30w_c and 30w_c and/or including opposed cut surfaces 30r_{1c} and 30r_{1c}--

Page 56, line 16, after "Fig. 20" insert --including opposed cut surfaces 30r_{1c} and 30r_{1c}--.

Page 56, line 35, after "Fig. 20" insert -- including opposed cut surfaces 30r_{1c} and 30r_{1c}--.

Page 57, line 1, after "Fig. 20" insert --, including opposed cut surfaces 30r_{1c} and 30r_{1c} (i.e. seared opposed cut surfaces)--.

Page 57, line 8, after "Fig. 20" insert --, including opposed cut surfaces 30w_c and 30w_c--.

Page 57, line 23, "Fig. 20" insert --, including opposed cut surfaces 30w_c and 30w_c--.

Page 57, line 29, "Fig. 20" insert --, including opposed cut surfaces 30w_c and 30w_c--.

Page 57, line 36, "Fig. 20" insert --, including opposed cut surfaces 30w_c and 30w_c--.

IN THE CLAIMS:

Please cancel claims 1-80 without prejudice and add the following claims:

1 81. A method for producing a polymeric foamed material panel
2 comprising:
3 cutting a polymeric foamed material with a hot wire cutter in a first direction
4 from a surface of the polymeric foamed material wherein the first direction is generally
5 perpendicular to the surface;
6 cutting subsequently with the hot wire cutter the polymeric foamed material in
7 a second direction generally perpendicular to the first direction to produce a first cut seared
8 surface terminating in opposed ends of said polymeric foamed material;
9 cutting subsequently with the hot wire cutter the polymeric foamed material in
10 a third direction generally perpendicular to the second direction to produce a second cut
11 seared surface terminating in said opposed ends of said polymeric foamed material;
12 providing a brace member having a web and at least one flange secured to the
13 web; and
14 disposing respectively the web and the flange of the brace member against the
15 first cut seared surface and the second cut seared surface to produce a polymeric foamed
16 material panel.

1 82. The method of Claim 81 additionally comprising cutting with said hot
2 wire cutter said polymeric foamed material to produce a defined planar surface; and said
3 surface is a defined side surface of the polymeric foamed material.

1 83. The method of Claim 82 wherein said second direction is a generally
2 perpendicular direction from said defined planar surface.

1 84. The method of Claim 81 additionally comprising forming a flange-
2 return slot in said polymeric foamed material; and said providing a brace member comprises
3 providing said brace member to additionally have a flange return secured to said flange.

1 85. The method of Claim 83 additionally comprising forming a flange-
2 return slot in said polymeric foamed material; and said providing a brace member comprises
3 providing said brace member to additionally have a flange return secured to said flange.

1 86. The method of Claim 84 additionally comprising disposing said flange
2 return of said brace member in said flange-return slot in said polymeric foamed material.

1 87. The method of Claim 85 additionally comprising disposing said flange
2 return of said brace member in said flange-return slot in said polymeric foamed material.

1 88. The method of Claim 81 additionally comprising cutting with the hot
2 wire cutter the polymeric foamed material to produce a third cut seared surface terminating in
3 said opposed ends of said polymeric foamed material; and cutting with the hot wire cutter the
4 polymeric foamed material to produce a fourth cut seared surface terminating in said opposed
5 ends of said polymeric foamed material.

1 89. The method of Claim 86 additionally comprising cutting with the hot
2 wire cutter the polymeric foamed material to produce a third cut seared surface terminating in
3 said opposed ends of said polymeric foamed material; and cutting with the hot wire cutter the
4 polymeric foamed material to produce a fourth cut seared surface terminating in said opposed
5 ends of said polymeric foamed material.

1 90. The method of Claim 88 additionally comprising providing a second
2 brace member having a second web and at least one second flange secured to the second
3 web; and disposing respectively the second web and the second flange of the second brace
4 member against the fourth cut seared surface and the third cut seared surface.

1 91. The method of Claim 89 additionally comprising providing a second
2 brace member having a second web and at least one second flange secured to the second
3 web; and disposing respectively the second web and the second flange of the second brace
4 member against the fourth cut seared surface and the third cut seared surface.

1 92. The method of Claim 88 wherein said fourth cut seared surface is
2 generally perpendicular to said third cut seared surface.

1 93. The method of Claim 91 wherein said fourth cut seared surface is
2 generally perpendicular to said third cut seared surface.

1 94. The method of Claim 90 additionally comprising forming a second
2 flange-return slot in said polymeric foamed material; and said providing a second brace
3 member comprises providing said second brace member to additionally have a second flange
4 return secured to said second flange.

1 95. The method of Claim 91 additionally comprising forming a second
2 flange-return slot in said polymeric foamed material; and said providing a second brace
3 member comprises providing said second brace member to additionally have a second flange
4 return secured to said second flange.

1 96. The method of Claim 94 additionally comprising disposing said
2 second flange return of said second brace member in said second flange-return slot in said
3 polymeric foamed material.

1 97. The method of Claim 95 additionally comprising disposing said
2 second flange return of said second brace member in said second flange-return slot in said
3 polymeric foamed material.

1 98. The method of Claim 82 wherein said brace member having a web and
2 at least one flange secured to the web comprises said brace member having said web, a first
3 flange secured to said web, and a second flange secured to said web; and said disposing
4 additionally comprises respectively positioning the web and the first flange of the brace
5 member against the first cut seared surface and the second cut seared surface such that said
6 second flange is generally aligned with the defined planar surface of the polymeric foamed
7 material.

1 99. The method of Claim 98 additionally comprising forming a first
2 flange-return slot in the polymeric foamed material and forming a second flange-return slot
3 in the polymeric foamed material; said brace member additionally comprises a first flange
4 return secured to said first flange and a second flange return secured to said second flange;
5 and said disposing additionally comprises respectively positioning said first flange return and

1 104. The method of Claim 91 wherein a portion of the web of the brace
2 member and a portion of the second web of the second brace member protrude from the
3 polymeric foamed material panel.

1 105. The method of Claim 103 additionally comprising securing a track
2 member to the brace member.

1 106. The method of Claim 104 additionally comprising securing a track
2 member to the brace member and to the second brace member.

1 107. The method of Claim 81 additionally comprising cutting the polymeric
2 foamed material with the hot wire cutter to produce the polymeric foamed material having a
3 tongue and a channel.

1 108. The method of Claim 98 additionally comprising cutting the polymeric
2 foamed material with the hot wire cutter to produce the polymeric foamed material having a
3 tongue and a channel; and said cutting subsequently with the hot wire cutter the polymeric
4 foamed material in said second direction additionally producing an opposed first cut seared
5 surface terminating in said opposed ends of said polymeric foamed material and opposed to
6 said first cut seared surface such that said opposed first cut seared surface and said first cut
7 seared surface form a first slot wherein said web of said brace member lodges; and said
8 cutting subsequently with the hot wire cutter the polymeric foamed material in said third
9 direction additionally producing an opposed second cut seared surface terminating in said
10 opposed ends of said polymeric foamed material and opposed to said second cut seared
11 surface such that said opposed second cut seared surface and said second cut seared surface
12 form a second slot wherein said flange of said brace member lodges.

1 109. The method of Claim 102 additionally comprising cutting the
2 polymeric foamed material with the hot wire cutter to produce the polymeric foamed material
3 having a tongue and a channel.

1 110. The method of Claim 81 additionally comprising computer operating
2 said hot wire cutter; and said polymeric foamed material is generally stationary.

1 111. The method of Claim 98 additionally comprising computer operating
2 said hot wire cutter; and said polymeric foamed material is generally stationary.

1 112. The method of Claim 109 additionally comprising computer operating
2 said hot wire cutter; and said polymeric foamed material is generally stationary.

1 113. A polymeric foamed material panel produced in accordance with the
2 method of Claim 81.

1 114. A polymeric foamed material panel produced in accordance with the
2 method of Claim 90.

1 115. A polymeric foamed material panel produced in accordance with the
2 method of Claim 99.

1 116. A polymeric foamed material panel produced in accordance with the
2 method of Claim 102.

1 117. A polymeric foamed material panel produced in accordance with the
2 method of Claim 103.

1 118. A polymeric foamed material panel produced in accordance with the
2 method of Claim 104.

1 119. A polymeric foamed material panel produced in accordance with the
2 method of Claim 112.

1 120. A method for producing a plurality of polymeric foamed material
2 structures having seared surfaces for contacting brace members comprising the steps of:

- 3 a) providing a block of polymeric foamed material having a side and a pair of
4 opposed ends;

- 5 b) cutting the block of polymeric foamed material with a plurality of hot wire
6 cutters in a first direction generally perpendicular from said side of said block
7 of polymeric foamed material;
- 8 c) cutting, immediately after said cutting step (b), the block of polymeric
9 foamed material with the plurality of hot wire cutters in a second direction
10 generally perpendicular from said first direction until each hot wire cutter
11 forms in the polymeric foamed material a first respective cut seared surface
12 terminating in said opposed ends of said block of polymeric foamed material;
- 13 d) cutting, immediately after said cutting step (c), the block of polymeric
14 foamed material with the plurality of hot wire cutters in a third direction
15 generally perpendicular from said second direction until each hot wire cutter
16 forms in the polymeric foamed material a second respective cut seared
17 surface terminating in said opposed ends of said block of said polymeric
18 foamed material;
- 19 e) cutting the block of polymeric foamed material with the plurality of hot wire
20 cutters in a fourth direction until each hot wire cutter forms in the polymeric
21 foamed material a third respective cut seared surface terminating in said
22 opposed ends of said block of polymeric foamed material;
- 23 f) cutting the block of polymeric foamed material with the plurality of hot wire
24 cutters in a fifth direction until each hot wire cutter forms in the polymeric
25 foamed material a fourth respective cut seared surface terminating in said
26 opposed ends of said block of polymeric foamed material; and
- 27 g) cutting the block of polymeric foamed material with the plurality of hot wire
28 cutters in a sixth direction to produce a plurality of polymeric foamed
29 material structures, each of said polymeric foamed material structures having
30 a first cut seared surface and a second cut seared surface for contacting a first
31 brace member and a third cut seared surface and a fourth cut seared surface
32 for contacting a second brace member.

1 121. The method of Claim 120 additionally comprising cutting the block of
2 polymeric foamed material with the plurality of hot wire cutters between said cutting step (d)
3 and said cutting step (e).

1 122. The method of Claim 120 additionally comprising cutting the block of
2 polymeric foamed material with the plurality of hot wire cutters such that each of said
3 polymeric foamed material structures has a tongue member and a channel member.

1 123. The method of Claim 121 additionally comprising cutting the block of
2 polymeric foamed material with the plurality of hot wire cutters such that each of said
3 polymeric foamed material structures has a tongue member and a channel member.

1 124. The method of Claim 120 wherein said cutting step (f) is before said
2 cutting step (e).

1 125. The method of Claim 123 wherein said cutting step (g) is after said
2 cutting step (f).

1 126. The method of Claim 121 additionally comprising computer operating
2 said hot wire cutters; and said block of polymeric foamed material is generally stationary;
3 and said cutting step (c) additionally producing an opposed first respective cut seared surface
4 terminating in said opposed ends of said block of polymeric foamed material and opposed to
5 said first respective cut seared surface to form a first slot in each of said polymeric foamed
6 material structures; and said cutting step (d) additionally producing an opposed second
7 respective cut seared surface terminating in said opposed ends of said block of polymeric
8 foamed material and opposed to said second respective cut seared surface to form a second
9 slot in each of said polymeric foamed material structures, each of said polymeric foamed
10 material structures having said first slot and said second slot for receiving a first brace
11 member; and said cutting step (e) additionally producing an opposed third respective cut
12 seared surface terminating in said opposed ends of said block of polymeric foamed material
13 and opposed to said third respective cut seared surface to form a third slot in each of said
14 polymeric foamed material structures; and said cutting step (f) additionally producing an

opposed fourth respective cut seared surface terminating in said opposed ends of said block of polymeric foamed material and opposed to said fourth respective cut seared surface to form a fourth slot in each of said polymeric foamed material structures, each of said polymeric foamed material structures having said third slot and said fourth slot for receiving a second brace member.

127. The method of Claim 124 additionally comprising computer operating said hot wire cutters; and said block of polymeric foamed material is generally stationary; and said fifth direction is generally perpendicular from said fourth direction; and said sixth direction is generally perpendicular from said fifth direction.

128. The method of Claim 120 additionally comprising forming a first-return slot, a second flange-return slot, a third flange-return slot, and a fourth flange-return slot in each of the polymeric foamed material structures.

129. The method of Claim 124 additionally comprising forming a first-return slot, a second flange-return slot, a third flange-return slot, and a fourth flange-return slot in each of the polymeric foamed material structures.

130. The method of Claim 128 additionally comprising providing a plurality of first brace members wherein each of said first brace members comprises a first web, a first flange secured to said first web, a first flange return secured to said first flange, a second flange secured to said web, and a second flange return secured to said second flange; and additionally comprising providing a plurality of second brace members wherein each of said second brace members comprises a second web, a third flange secured to said second web, a third flange return secured to said third flange, a fourth flange secured to said second web, a fourth flange return secured to said fourth flange; and disposing the plurality of the first brace members and the plurality of the second brace members in the plurality of polymeric foamed material structures such that each of said polymeric foamed material structures comprises the first web of the first brace member positioned against the first cut seared surface, the first flange positioned against the second cut secured surface, the first flange return positioned in the first flange-return slot, the second flange return positioned in

the second flange-return slot, the second web of the second brace member positioned against the fourth cut seared surface, the third flange positioned against the third cut seared surface, the third flange return positioned in the third flange-return slot, and the fourth flange return positioned in the fourth flange-return slot.

131. The method of Claim 129 additionally comprising providing a plurality of first brace members wherein each of said first brace members comprises a first web, a first flange secured to said first web, a first flange return secured to said first flange, a second flange secured to said web, and a second flange return secured to said second flange; and additionally comprising providing a plurality of second brace members wherein each of said second brace members comprises a second web, a third flange secured to said second web, a third flange return secured to said third flange, a fourth flange secured to said second web, a fourth flange return secured to said fourth flange; and disposing the plurality of the first brace members and the plurality of the second brace members in the plurality of polymeric foamed material structures such that each of said polymeric foamed material structures comprises the first web of the first brace member positioned against the first cut seared surface, the first flange positioned against the second cut secured surface, the first flange return positioned in the first flange-return slot, the second flange return positioned in the second flange-return slot, the second web of the second brace member positioned against the fourth cut seared surface, the third flange positioned against the third cut seared surface, the third flange return positioned in the third flange-return slot, and the fourth flange return positioned in the fourth flange-return slot.

132. The method of Claim 130 additionally comprising cutting the block of polymeric foamed material prior to said cutting step (g).

133. The method of Claim 130 additionally comprising cutting the block of polymeric foamed material after said cutting step (g) and prior to disposing the plurality of the first brace members and the plurality of the second brace members in the plurality of polymeric foamed material structures.

1 134. A plurality of polymeric foamed material structures produced in
2 accordance with the method of Claim 120.

1 135. A plurality of polymeric foamed material structures produced in
2 accordance with the method of Claim 130.

1 136. A plurality of polymeric foamed material structures produced in
2 accordance with the method of Claim 131.

1 137. A method for producing a polymeric foamed material panel
2 comprising the steps of:

3 a) obtaining a polymeric foamed material structure produced in
4 accordance with a method comprising:

5 cutting a polymeric foamed material with a cutter in a first direction
6 from a side of the polymeric foamed material wherein the first direction is generally
7 perpendicular to the side and said cutter is selected from the group consisting of a hot wire
8 cutter and a laser cutter;

9 cutting subsequently with the cutter the polymeric foamed material in
10 a second direction from the first direction to produce a first cut surface terminating in
11 opposed ends of said polymeric foamed material;

12 cutting subsequently with the cutter the polymeric foamed material in
13 a third direction from the second direction to produce a second cut surface terminating in said
14 opposed ends of said polymeric foamed material; and

15 b) providing a brace member having a web and at least one flange
16 secured to the web; and

17 c) disposing the brace member in the polymeric foamed material
18 structure such that the web is against the first cut surface and the flange is against the second
19 cut surface to produce a polymeric foamed material panel.

1 138. The method of Claim 137 wherein said second direction is generally
2 perpendicular from the first direction.

1 139. The method of Claim 137 wherein said third direction is generally
2 perpendicular from the second direction.

1 140. The method of Claim 138 wherein said third direction is generally
2 perpendicular from the second direction.

1 141. The method of Claim 137 wherein said method in obtaining step (a)
2 for producing said polymeric foamed material structure additionally comprises cutting the
3 polymeric foamed material with the cutter to produce the polymeric foamed material having
4 a tongue and a channel.

1 142. The method of Claim 140 wherein said method in obtaining step (a)
2 for producing said polymeric foamed material structure additionally comprises cutting the
3 polymeric foamed material with the cutter to produce the polymeric foamed material having
4 a tongue and a channel.

1 143. The method of Claim 137 wherein said brace member comprises a
2 generally C-shape.

1 144. The method of Claim 140 wherein said brace member comprises a
2 generally C-shape.

1 145. The method of Claim 141 wherein said brace member comprises a
2 generally C-shape.

1 146. The method of Claim 137 wherein said brace member comprises a
2 generally Z-shape.

1 147. The method of Claim 141 wherein said brace member comprises a
2 generally Z-shape.

1 148. The method of Claim 57 wherein a portion of the web of the brace
2 member protrudes from the polymeric foamed material panel.

1 149. The method of Claim 140 wherein a portion of the web of the brace
2 member protrudes from the polymeric foamed material panel.

1 150. The method of Claim 146 wherein a portion of the web of the brace
2 member protrudes from the polymeric foamed material panel.

1 151. The method of Claim 137 wherein said method in obtaining step (a)
2 for producing said polymeric foamed material structure additionally comprising forming,
3 prior to said disposing step (c), a flange-return slot in the polymeric foamed material; and
4 said providing a brace member comprises providing said brace member to additionally have
5 a flange return secured to said flange.

1 152. The method of Claim 141 wherein said method in obtaining step (a)
2 for producing said polymeric foamed material structure additionally comprising forming,
3 prior to said disposing step (c), a flange-return slot in the polymeric foamed material; and
4 said providing a brace member comprises providing said brace member to additionally have
5 a flange return secured to said flange.

1 153. The method of Claim 151 additionally comprising disposing said
2 flange return of said brace member in said flange-return slot in said polymeric foamed
3 material structure.

1 154. The method of Claim 152 additionally comprising disposing said
2 flange return of said brace member in said flange-return slot in said polymeric foamed
3 material structure.

1 155. The method of Claim 137 wherein said method in said obtaining step
2 (a) for producing said polymeric foamed material structure additionally comprising cutting
3 with the cutter the polymeric foamed material to produce a third cut surface terminating in
4 said opposed ends of said polymeric foamed material; and cutting with the cutter the
5 polymeric foamed material to produce a fourth cut surface terminating in said opposed ends
6 of said polymeric foamed material.

1 156. The method of Claim 141 wherein said method in said obtaining step
2 (a) for producing said polymeric foamed material structure additionally comprising cutting
3 with the cutter the polymeric foamed material to produce a third cut surface terminating in
4 said opposed ends of said polymeric foamed material; and cutting with the cutter the
5 polymeric foamed material to produce a fourth cut surface terminating in said opposed ends
6 of said polymeric foamed material.

1 157. The method of Claim 155 additionally comprising providing a second
2 brace member having a second web and at least one second flange secured to the second
3 web; and disposing respectively the second web and the second flange of the second brace
4 member against the fourth cut surface and the third cut surface.

1 158. The method of Claim 156 additionally comprising providing a second
2 brace member having a second web and at least one second flange secured to the second
3 web; and disposing respectively the second web and the second flange of the second brace
4 member against the fourth cut surface and the third cut surface.

1 159. The method of Claim 137 wherein said method in obtaining step (a)
2 for producing said polymeric foamed material structure additionally comprising computer
3 operating said cutter; and said polymeric foamed material is generally stationary; and said
4 side is a defined surface of the polymeric foamed material.

1 160. A method for producing a polymeric foamed material panel
2 comprising the steps of:

3 a) providing a polymeric foamed material structure comprising a
4 pair of opposed ends, a side surface, a first hotwire-cut seared surface having been cut by a
5 hotwire cutter in a first direction relative to said side surface and terminating in said pair of
6 opposed ends, a second hotwire-cut seared surface having been cut by a hotwire cutter in a
7 second direction from said first hotwire-cut seared surface and terminating in said pair of
8 opposed ends, and a third hotwire-cut seared surface having been cut by a hotwire cutter in a

third direction from said second hotwire-cut seared surface and terminating in said pair of opposed ends;

b) providing a brace member having a web and at least one flange secured to the web; and

c) disposing respectively the web and the flange of the brace member against the second hotwire-cut seared surface and the third hotwire-cut seared surface to produce a polymeric foamed material panel.

161. The method of Claim 160 wherein said first direction is generally perpendicular to said side surface.

162. The method of Claim 160 wherein said brace member comprises a generally C-shape.

163. The method of Claim 160 wherein said brace member comprises a generally Z-shape.

164. The method of Claim 162 wherein a portion of the web of the brace member protrudes from the polymeric foamed material panel.

165. A polymeric foamed material panel produced in accordance with the method of Claim 160.

166. A method for forming a structure comprising the steps of:

a) cutting a first polymeric foamed material with a first cutter in a first direction relative to a first side surface of the first polymeric foamed material;

b) cutting with the first cutter the first polymeric foamed material in a second direction relative to the first direction to produce a first-cutter first cut surface terminating in opposed ends of said first polymeric foamed material;

c) cutting with the first cutter the first polymeric foamed material in a third direction relative to the second direction to produce a first-cutter second cut surface terminating in said opposed ends of said first polymeric foamed material;

d) cutting the first polymeric foamed material with the first cutter to produce a first tongue in the first polymeric foamed material;

e) providing a first brace member having a first web and at least one first flange secured to the first web;

f) disposing respectively the first web and the first flange of the first brace member against the first-cutter first cut surface of step (b) and the first-cutter second cut surface of step (c) to produce a first polymeric foamed material panel having said first tongue;

g) cutting a second polymeric foamed material with a second cutter to produce a second channel in the second polymeric foamed material;

h) cutting the second polymeric foamed material with the second cutter in a first direction relative to a second side surface of the second polymeric foamed material;

i) cutting with the second cutter the second polymeric foamed material in a second direction relative to the first direction to produce a second-cutter first cut surface terminating in opposed ends of said second polymeric foamed material;

j) cutting with the second cutter the second polymeric foamed material in a third direction relative to the second direction to produce a second-cutter second cut surface terminating in said opposed ends of said second polymeric foamed material;

k) providing a second brace member having a second web and at least one second flange secured to the second web;

l) disposing respectively the second web and the second flange of the second brace member against the second-cutter first cut surface of step (i) and the second-cutter second cut surface of step (j) to produce a second polymeric foamed material panel having said second channel; and

m) sliding said first tongue of said first polymeric foamed material panel into said second channel of said second polymeric foamed material panel to form a structure.

167. The method of Claim 166 additionally comprising cutting the first polymeric foamed material with the first cutter to produce a first channel in the polymeric

foamed material and cutting the second polymeric foamed material with the second cutter to produce a second tongue in the second polymeric foamed material.

168. The method of Claim 166 wherein said first direction of step (a) is generally perpendicular to the first side surface of step (a); said second direction of step (b) is generally perpendicular to said first direction of step (a); said third direction step (c) is generally perpendicular to said second direction of step (b); and wherein said first direction of step (h) is generally perpendicular to the second side surface of step (h); said second direction of step (i) is generally perpendicular to said first direction of step (h); said third direction of step (j) is generally perpendicular to said second direction of step (i).

169. The method of Claim 167 wherein said first direction of step (a) is generally perpendicular to the first side surface of step (a); said second direction of step (b) is generally perpendicular to said first direction of step (a); said third direction step (c) is generally perpendicular to said second direction of step (b); and wherein said first direction of step (h) is generally perpendicular to the second side surface of step (h); said second direction of step (i) is generally perpendicular to said first direction of step (h); said third direction of step (j) is generally perpendicular to said second direction of step (i).

170. The method of Claim 166 additionally comprising cutting respectively said first polymeric foamed material with said first cutter in said cutting steps (a) through (d) generally simultaneously with cutting respectively said second polymeric foamed material with said second cutter in said cutting steps (g) through (j).

171. The method of Claim 166 wherein said cutting step (b) additionally producing an opposed first-cutter first cut surface terminating in said opposed ends of said first polymeric foamed material and opposed to said first-cutter first cut surface to form a first-cutter first slot in said first polymeric foamed material; and said cutting step (c) additionally producing an opposed first-cutter second cut surface terminating in said opposed ends of said first polymeric foamed material and opposed to said first-cutter second cut surface to form a first-cutter second slot in said first polymeric foamed material such that after said disposing step (f) said first web and said first flange of said first brace member are

9 further disposed respectively in said first-cutter first slot and in said first-cutter second slot;
10 and said cutting step (i) additionally producing an opposed second-cutter first cut surface
11 terminating in said opposed ends of said second polymeric foamed material and opposed to
12 said second-cutter first cut surface to form a second-cutter first slot in said second polymeric
13 foamed material; and said cutting step (j) additionally producing an opposed second-cutter
14 second cut surface terminating in said opposed ends of said second polymeric foamed
15 material and opposed to said second-cutter second cut surface to form a second-cutter second
16 slot in said second polymeric foamed material such that after said disposing step (l) said
17 second web and said second flange of said second brace member are further disposed
18 respectively in said second-cutter first slot and in second-cutter second slot.

1 172. The method of Claim 166 wherein said second cutter and said first
2 cutter are respectively a cutter selected from the group consisting of a hotwire cutter and a
3 laser cutter.

1 173. The method of Claim 166 wherein said first brace member comprises a
2 generally C-shape, and a portion of the first web of the first brace member protrudes from the
3 first polymeric foamed material panel.

1 174. A structure produced in accordance with the method of Claim 166.

1 175. A method for forming a structure comprising the steps of:

2 a) providing a first polymeric foamed material structure
3 comprising a pair of opposed first ends, a first defined side surface, a first tongue, a first
4 hotwire-cut seared surface having been cut by a hotwire cutter in a first direction relative to
5 said first defined side surface and terminating in said pair of opposed first ends, a second
6 hotwire-cut seared surface having been cut by a hotwire cutter in a second direction from
7 said first hotwire-cut seared surface and terminating in said pair of opposed first ends, and a
8 third hotwire-cut seared surface having been cut by a hotwire cutter in a third direction from
9 said second hotwire-cut seared surface and terminating in said pair of opposed first ends;

10 b) providing a first brace member having a first web and at least
11 one first flange secured to the web;

12 c) disposing respectively the first web and the first flange of the
13 first brace member against the second hotwire-cut seared surface of step (a) and the third
14 hotwire-cut seared surface of step (a) to produce a first polymeric foamed material panel
15 having said first tongue;

16 d) providing a second polymeric foamed material structure
17 comprising a pair of opposed second ends, a second defined side surface, a second channel, a
18 first hotwire-cut seared surface having been cut by a hotwire cutter in a first direction relative
19 to said second defined side surface and terminating in said pair of opposed second ends, a
20 second hotwire-cut seared surface having been cut by a hotwire cutter in a second direction
21 from said first hotwire-cut seared surface and terminating in said pair of opposed second
22 ends, and a third hotwire-cut seared surface having been cut by a hotwire cutter and in a third
23 direction from said second hotwire-cut seared surface and terminating in said pair of opposed
24 second ends;

25 e) providing a second brace member having a second web and at
26 least one second flange secured to the web;

27 f) disposing respectively the second web and the second flange of
28 the second brace member against the second hotwire-cut seared surface of step (d) and the
29 third hotwire-cut seared surface of step (d) to produce a second polymeric foamed material
30 panel having said second channel; and

31 g) disposing said first tongue of said first polymeric foamed
32 material panel into said second channel of said second polymeric foamed material panel to
33 form a structure.

1 176. A structure formed in accordance with the method of Claim 175.

1 177. A method for producing a plurality of polymeric foamed material
2 panels comprising the steps of:

3 a) cutting a polymeric foamed material with a plurality of cutters
4 in a generally perpendicular direction from a defined surface of the polymeric foamed
5 material;

6 b) cutting in at least a second direction the polymeric foamed
7 material of step (a) with the plurality of cutters until each cutter forms in the polymeric
8 foamed material a first respective slot terminating in opposed ends of the polymeric foamed
9 material;

10 c) cutting with the plurality of cutters the polymeric foamed
11 material of step (b) in said generally perpendicular direction of step (a) to produce a plurality
12 of polymeric foamed material structures having first slots; and

13 d) disposing first brace members in the first slots of the polymeric
14 foamed material structures of step (c) to produce a plurality of polymeric foamed material
15 panels with each polymeric foamed material panel having one of said first brace members.

1 178. The method of Claim 177 wherein said first brace members each
2 comprise a generally C-shape, and said defined surface is a side of said polymeric foamed
3 material.

1 179. The method of Claim 178 wherein each of first brace members include
2 a web a portion which protrudes from said polymeric foamed material panel.

1 180. A plurality of polymeric foamed material panels produced in
2 accordance with the method of Claim 177.

1 181. The method of Claim 177 additionally comprising cutting the
2 polymeric foamed material with the plurality of cutters until each cutter forms a second
3 respective slot in the polymeric foamed material and said produced plurality of polymeric
4 foamed material structures include second slots.

1 182. The method of Claim 181 additionally comprising disposing second
2 brace members in the second slots of the produced polymeric foamed material structures
3 such that each polymeric foamed material panel includes one of said second brace members.

1 183. A method for producing a plurality of polymeric foamed material
2 panels comprising the steps of:

3 a) providing a block of polymeric foamed material in a generally
4 stationary position having a defined surface and a pair of opposed ends;

5 b) moving from said defined surface a plurality of cutters through
6 the generally stationary block of polymeric foamed material of step (a) in a generally
7 perpendicular direction of travel;

8 c) interrupting the movement of the plurality of cutters from said
9 generally perpendicular direction of travel through the generally stationary blocks of
10 polymeric foamed material to move the cutters in at least one direction of travel which differs
11 from said generally perpendicular direction of travel such that each cutter produces a
12 respective brace-receiving slot in the polymeric foamed material terminating in said opposed
13 ends;

14 d) continuing said moving step (b) of said plurality of cutters in
15 said generally perpendicular direction of travel, while intermittently interrupting the
16 movement of the plurality of cutters from generally perpendicular direction of travel to move
17 the cutters in at least one direction of travel which differs from said generally perpendicular
18 direction of travel such that each cutter produces at least one additional respective brace-
19 receiving slot in the polymeric foamed material, until said plurality of cutters have moved
20 completely through the generally stationary block of polymeric foamed material after which
21 a plurality of polymeric foamed material structures are produced with each polymeric foamed
22 material structure having a plurality of brace-receiving slots; and

23 e) disposing brace members into the brace-receiving slots of the
24 polymeric foamed material structures of step (d) to produce a plurality of polymeric foamed
25 material panels with each polymeric foamed material panel having two of said brace
26 members.

1 184. A plurality of polymeric foamed material panels produced in
2 accordance with the method of Claim 183.

1 185. The method of Claim 183 wherein said defined surface comprises a
2 side of said block of polymeric foamed material.

1 186. A method for producing a plurality of polymeric foamed material
2 panels comprising the steps of:

3 a) cutting a polymeric foamed material in a first direction with a
4 plurality of cutters generally moving in unison;

5 b) cutting subsequently the polymeric foamed material of step (a)
6 in a second direction with said plurality of cutters generally moving in unison;

7 c) cutting, after said cutting step (b), the polymeric foamed
8 material of step (b) in said first direction with said plurality of cutters generally moving in
9 unison;

10 d) cutting, after said cutting step (c), the polymeric foamed
11 material of step (c) in a third direction with said plurality of cutters generally moving in
12 unison;

13 e) cutting, after said cutting step (d), the polymeric foamed
14 material of step (d) in said first direction with said plurality of cutters generally moving in
15 unison until said cutters have cut through the polymeric foamed material of step (d) to
16 produce a plurality of polymeric foamed material structures having brace-receiving
17 configurations; and

18 f) sliding brace members into the brace-receiving configurations
19 of said polymeric foamed material structures of step (e) to produce a plurality of polymeric
20 foamed material panels with each polymeric foamed material panel having one of said brace
21 members.

1 187. A plurality of polymeric foamed material panels produced in
2 accordance with the method of Claim 186.

1 188. A method for producing a plurality of polymeric foamed material
2 panels comprising the steps of:

3 a) providing a block of polymeric foamed material having a
4 defined surface and a pair of opposed ends;

5 b) moving from said defined surface a plurality of cutters through
6 the block of polymeric foamed material in a generally perpendicular direction of travel, while

7 interrupting at least one time the moving of the plurality of cutters in said generally
8 perpendicular direction of travel to move the cutters through the block of polymeric foamed
9 material in at least one direction of travel which differs from said generally perpendicular
10 direction of travel, such that each cutter produces a respective brace-receiving slot in the
11 polymeric foamed material terminating in said opposed ends, until said plurality of cutters
12 have moved completely through the block of polymeric foamed material to produce a
13 plurality of polymeric foamed material structures with each structure having at least one
14 brace-receiving slot; and

15 c) disposing a brace member into each brace-receiving slot of said
16 polymeric foamed material structures to produce a plurality of polymeric foamed material
17 panels with each of said polymeric foamed material panels having at least one brace member.

1 189. The method of Claim 188 wherein said defined surface is a side
2 surface of said block of polymeric foamed material.

1 190. A plurality of polymeric foamed material panels produced in
2 accordance with the method of Claim 188.

1 191. A method for producing a polymeric foamed material panel
2 comprising the steps of:

- 3 a) providing a block of polymeric foamed material having a defined surface and
4 a pair of opposed ends;
- 5 b) cutting the block of polymeric foamed material in a first direction relative to
6 the defined surface;
- 7 c) cutting the block of polymeric foamed material in a second direction to
8 produce a first slot including a first cut surface terminating in said opposed
9 ends;
- 10 d) cutting the block of polymeric foamed material from said first slot to produce
11 a second slot communicating with the first slot and including a second cut
12 surface terminating in said opposed ends; and

- 13 e) disposing a brace member against said first cut surface and said second cut
14 surface respectively in said first slot and in said second slot to produce a
15 polymeric foamed material panel.

1 192. A polymeric foamed material panel produced in accordance with the
2 method of Claim 191.

1 193. A method for producing a polymeric foamed material panel
2 comprising the steps of:

- 3 a) providing a polymeric foamed material having a pair of opposed ends;
4 b) cutting the block of polymeric foamed material in a first direction to produce a
5 defined planar surface;
6 c) cutting the block of polymeric foamed material from said defined planar
7 surface in a second direction relative to said first direction to produce a web-
8 receiving slot including a web-contacting cut surface terminating in said
9 opposed ends;
10 d) cutting the block of polymeric foamed material in at least one third direction
11 from said web-receiving slot to produce a flange-receiving slot including a
12 flange-contacting cut surface terminating in said opposed ends;
13 e) providing a brace member having a web, and a first flange and a second
14 flange integrally secured to the web; and
15 f) disposing respectively said web and said first flange of said brace member
16 against said web-contacting cut surface in said web-receiving slot and against
17 said flange-contacting cut surface in said flange-receiving slot to produce a
18 polymeric material panel having said second flange of said brace member
19 generally aligned with said defined planar surface.

1 194. A polymeric foamed material panel produced in accordance with the
2 method of Claim 193.

1 195. A method for producing a polymeric foamed material structure
2 comprising the steps of:

- a) providing a block of polymeric foamed material having a pair of opposed ends;
- b) cutting the block of polymeric foamed material in a first direction;
- c) cutting the block of polymeric foamed material in a second direction to produce a first cut surface terminating in said opposed ends;
- d) cutting the block of polymeric foamed material from said first cut surface to produce a second cut surface terminating in said opposed ends;
- e) providing a brace member having a web, a first flange secured to the web, and a second flange secured to the web; and
- f) disposing the web and the first flange of the brace member respectively against the first cut surface and the second cut surface to produce a polymeric foamed material structure.

196. The method of Claim 195 wherein said first cut surface and said second cut surface respectively comprise a first cut seared surface and a second cut seared surface produced by a hotwire cutter.

197. The method of Claim 195 wherein said providing step (a) additionally comprises providing the block of polymeric foamed material to have a defined surface, and cutting in said cutting step (b) is in said first direction which is generally perpendicular to said defined surface and produces a defined planar surface; and said disposing step (f) additionally comprises generally aligning the second flange with said defined planar surface.

198. A polymeric foamed material structure produced in accordance with the method of Claim 195.

199. A method for producing a plurality of polymeric foamed material structures having slot sections for receiving stud members comprising the steps of:

- a) cutting a polymeric foamed material with a plurality of cutters in a generally perpendicular direction from a side of the polymeric foamed material;
- b) cutting subsequently in at least a second direction the polymeric foamed material of step (a) with the plurality of cutters until each cutter forms a first respective slot section in the polymeric foamed material, said first respective

slot section terminating in opposed ends of the polymeric foamed material;
and

- c) cutting in said generally perpendicular direction of step (a) the polymeric foamed material with the plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of first slot sections, with each polymeric foamed material structure having one of the first slot sections.

200. The method of Claim 199 wherein said plurality of cutters move generally simultaneously.

201. The method of Claim 199 wherein said polymeric foamed material of step (a), step (b) and step (c) is generally stationary.

202. The method of Claim 200 wherein said polymeric foamed material of step (a), step (b) and step (c) is generally stationary.

203. The method of Claim 199 wherein said at least one second direction comprises a second direction generally perpendicular to said generally perpendicular direction of step (a).

204. The method of Claim 202 wherein said at least one second direction comprises a second direction generally perpendicular to said generally perpendicular direction of step (a).

205. The method of Claim 199 additionally comprising cutting with the plurality of cutters, before said cutting step (c) and after said cutting step (b), the polymeric foamed material in said generally perpendicular direction of step (a) until each cutter forms a second respective slot section in the polymeric foamed material, said second respective slot section communicating with said first perspective slot section and terminating in opposed ends of the polymeric foamed material; and said cutting step (c) subsequently produces a plurality of polymeric foamed material structures having a plurality of first slot sections and a plurality of second slot sections, with each polymeric foamed material structure having one of the first slot sections and one of the second slot sections.

206. The method of Claim 204 additionally comprising cutting with the plurality of cutters, before said cutting step (c) and after said cutting step (b), the polymeric foamed material in said generally perpendicular direction of step (a) until each cutter forms a

second respective slot section in the polymeric foamed material, said second respective slot section communicating with said first perspective slot section and terminating in opposed ends of the polymeric foamed material; and said cutting step (c) subsequently produces a plurality of polymeric foamed material structures having a plurality of first slot sections and a plurality of second slot sections, with each polymeric foamed material structure having one of the first slot sections and one of the second slot sections.

207. The method Claim 199 additionally comprising cutting with the plurality of cutters, before said cutting step (c) and after said cutting step (b), the polymeric foamed material in said generally perpendicular direction of step (a) and subsequently in a fourth direction until each cutter forms a second respective slot section and a third respective slot section in the polymeric foamed material, said second respective slot section communicating with said first respective slot section and terminating in opposed ends of the polymeric foamed material and said third respective slot section communicating with said second respective slot section and terminating in opposed ends of the polymeric foamed material; and said cutting step (c) subsequently produces a plurality of polymeric foamed material structures having a plurality of first slot sections, a plurality of second slot sections, and a plurality of third slot sections, with each polymeric foamed material structure having one of the first slot sections, one of the second slot sections, and one of the third slot sections.

208. The method of Claim 204 additionally comprising cutting with the plurality of cutters, before said cutting step (c) and after said cutting step (b), the polymeric foamed material in said generally perpendicular direction of step (a) and subsequently in a fourth direction until each cutter forms a second respective slot section and a third respective slot section in the polymeric foamed material, said second respective slot section communicating with said first respective slot section and terminating in opposed ends of the polymeric foamed material and said third respective slot section communicating with said second respective slot section and terminating in opposed ends of the polymeric foamed material; and said cutting step (c) subsequently produces a plurality of polymeric foamed material structures having a plurality of first slot sections, a plurality of second slot sections, and a plurality of third slot sections, with each polymeric foamed material structure having one of the first slot sections, one of the second slot sections, and one of the third slot sections.

1 209. The method of Claim 199 wherein said plurality of cutters comprise
2 hot wire cutters.

1 210. The method of Claim 199 wherein said plurality of cutters comprise
2 laser cutters.

1 211. The method of Claim 206 additionally comprising computer operating
2 said plurality of cutters, and said plurality of cutters are selected from the group consisting of
3 hot wire cutters and laser cutters.

1 212. The method of Claim 208 additionally comprising computer operating
2 said plurality of cutters, and said plurality of cutters are selected from the group consisting of
3 hot wire cutters and laser cutters.

4 213. The method of Claim 209 additionally comprising computer operating
5 said plurality of hot wire cutters.

1 214. The method of Claim 210 additionally comprising computer operating
2 said plurality of laser cutters.

1 215. The method of Claim 199 additionally comprising providing a
2 plurality of stud members, and disposing the plurality of stud members in said first slot
3 sections of said polymeric foamed material structures to produce a plurality of polymeric
4 foamed material panels, with each polymeric foamed material panel having one of the stud
5 members.

1 216. The method of Claim 205 additionally comprising providing a
2 plurality of stud members, and disposing the plurality of stud members in said first slot
3 sections and in said second slot sections of said polymeric foamed material structures to
4 provide a plurality of polymeric foamed material panels, with each polymeric foamed
5 material panel having one of the stud members.

1 217. The method of Claim 207 additionally comprising providing a
2 plurality of stud members, and disposing the plurality of stud members in said first slot
3 sections and in said second slot sections and in said third slot sections of said polymeric
4 foamed material structures to produce a plurality of polymeric foamed material panels, with
5 each of the polymeric foamed material panels having one of the stud members respectively
6 occupying the first slot section, the second slot section and the third slot section associated
7 with said each of the polymeric foamed material panels.

1 218. The method of Claim 208 additionally comprising providing a
2 plurality of stud members, and disposing the plurality of stud members in said first slot
3 sections and in said second slot sections and in said third slot sections of said polymeric
4 foamed material structures to produce a plurality of polymeric foamed material panels, with
5 each of the polymeric foamed material panels having one of the stud members respectively
6 occupying the first slot section, the second slot section and the third slot section associated
7 with said each of the polymeric foamed material panels.

1 219. The method of Claim 218 additionally comprising computer operating
2 said plurality of cutters, and said plurality of cutters are selected from the group consisting of
3 hot wire cutters and laser cutters.

1 220. A method for producing a plurality of polymeric foamed material
2 structures having slots for receiving stud members comprising the steps of:

- 3 a) cutting a polymeric foamed material with a plurality of cutters in a generally
4 perpendicular direction from a side surface of the polymeric foamed material;
5 b) cutting subsequently in at least a second direction the polymeric foamed
6 material of step (a) with the plurality of cutters until each cutter forms a first
7 respective slot in the polymeric foamed material, said first respective slot
8 terminating in opposed ends of the polymeric foamed material;
9 c) cutting in said generally perpendicular direction of step (a) the polymeric
10 foamed material with the plurality of cutters to produce a plurality of
11 polymeric foamed material structures having a plurality of first slots, with
12 each polymeric foamed material structure having one of the first slots.

1 221. The method of claim 220 additional comprising cutting, prior to said
2 cutting step (c) and after said cutting step (b), the polymeric foamed material with the
3 plurality of cutters until each cutter forms a second respective slot in the polymeric foamed
4 material, said second respective slot terminating in opposed ends of the polymeric foamed
5 material; and said cutting step (c) subsequently producing a plurality of polymeric foamed
6 material structures having a plurality of first slots and a plurality of second slots, with each
7 polymeric foamed material structure having one of the first slots and one of the second slots.

222. The method of Claim 220 additionally comprising computer operating said plurality of cutters, and said plurality of cutters are selected from the group consisting of hot wire cutters and laser cutters.

223. The method of Claim 221 additionally comprising computer operating said plurality of cutters, and said plurality of cutters are selected from the group consisting of hot wire cutters and laser cutters.

224. The method of Claim 223 wherein said polymeric foamed material is generally stationary and said plurality of cutters generally move simultaneously.

225. The method of Claim 224 additionally comprising providing a plurality of stud members wherein each of said stud members comprises a web and a flange integrally bound to said web; and disposing the plurality of stud members in said first slots and in said second slots of said polymeric foamed material structures to produce a plurality of polymeric foamed material panels, with each of the polymeric foamed material panels having the web and the flange of one of the stud members respectively occupying the first slot and the second slot associated with said each of the polymeric foamed material panels.

226. A method for producing a plurality of polymeric foamed material structures having brace-receiving slots comprising the steps of:

- a) providing a generally stationary block of polymeric foamed material having a side surface and a pair of opposed ends;
- b) moving generally simultaneously from said side surface a plurality of cutters through the block of polymeric foamed material in a generally perpendicular direction of travel, while interrupting at least one time the moving of the plurality of cutters in said generally perpendicular direction of travel to move the cutters through the block of polymeric foamed material in at least one direction of travel comprising a direction which differs from said generally perpendicular direction of travel, such that each cutter produces a respective brace-receiving slot in the polymeric foamed material terminating in said opposed end, until said plurality of cutters have moved completely through the generally stationary block of polymeric foamed material to produce a plurality of polymeric foamed material structures having a plurality of brace-receiving

slots, with each polymeric foamed material structure having at least one of the
brace-receiving slots.

227. The method of Claim 226 additionally comprising computer operating
said plurality of cutters.

228. The method of Claim 227 wherein said plurality of cutters are selected
from the group consisting of hot wire cutters and laser cutters.

229. The method of Claim 226 additionally comprising providing a
plurality of brace members; and disposing the plurality of brace members in the plurality of
brace-receiving slots of said polymeric foamed material structures to produce a plurality of
polymeric foamed material panels, with each polymeric foamed material panel having at
least one of the brace members.

230. The method of Claim 228 additionally comprising providing a
plurality of brace members; and disposing the plurality of brace members in the plurality of
brace-receiving slots of said polymeric foamed material structures to produce a plurality of
polymeric foamed material panels, with each polymeric foamed material panel having at
least one of the brace members.

231. The method of Claim 226 wherein said at least one direction of travel
comprises a first direction of travel, a second direction of travel immediately following said
first direction of travel and being generally parallel to said generally perpendicular direction
of travel, and a third direction of travel immediately following said second direction of travel.

232. The method of Claim 231 wherein said first direction of travel is
generally normal to said generally perpendicular direction of travel, and said second direction
of travel is generally normal to said first direction of travel.

233. The method of Claim 228 wherein said at least one direction of travel
comprises a first direction of travel, a second direction of travel immediately following said
first direction of travel and being generally parallel to said generally perpendicular direction
of travel, and a third direction of travel immediately following said second direction of travel.

234. The method of Claim 233 wherein said first direction of travel is
generally normal to said generally perpendicular direction of travel, and said second direction
of travel is generally normal to said first direction of travel.

1 235. A plurality of polymeric foamed material structures produced in
2 accordance with the method of Claim 199.

1 236. The plurality of polymeric foamed material structures produced in
2 accordance with the method of Claim 215.

1 237. A plurality of polymeric foamed material panels produced in
2 accordance with the method of Claim 216.

1 238. A plurality of polymeric foamed material panels produced in
2 accordance with the method of Claim 217.

1 239. A plurality of polymeric foamed material structures produced in
2 accordance with the method of Claim 220.

1 240. A plurality of polymeric foamed material panels produced in
2 accordance with the method of Claim 225.

1 241. A plurality of polymeric foamed material structures produced in
2 accordance with the method of Claim 226.

1 242. A plurality of polymeric foamed material panels produced in
2 accordance with the method of Claim 229.

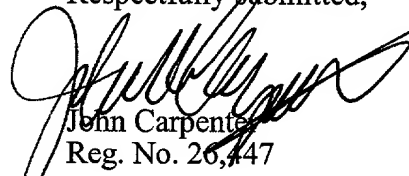
1 243. A plurality of polymeric foamed material structures produced in
2 accordance with the method of Claim 231.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,



John Carpenter
Reg. No. 26,447

TOWNSEND and TOWNSEND and CREW LLP
Two Embarcadero Center, 8th Floor
San Francisco, California 94111-3834
Tel: (415) 576-0200
Fax: (415) 576-0300
JWC:ldr
SF 1040359 v1

650 415 576 0200

PATENT APPLICATION

AN IMPROVED SYNTHETIC PANEL AND METHOD

Inventor: Kenneth P. Lanahan

Assignee: QB Technology L.C.

Entity: Small Entity

TOWNSEND and TOWNSEND and CREW LLP
Two Embarcadero Center, 8th Floor
San Francisco, California 94111-3834
(415) 576-0200

AN IMPROVED SYNTHETIC PANEL AND METHOD

This is a continuation-in-part patent application of copending patent application having Serial No. 08/556,265, filed on November 13, 1995, and entitled "A SYNTHETIC PANEL AND METHOD."

Background Of The Invention1. Field of the Invention

This invention relates to a synthetic panel. More specifically, this invention provides a polymeric foamed panel (e.g. a low density synthetic panel) and method for producing the polymeric foamed panel. This invention further provides a method for forming a structure with two or more polymeric foamed panels.

2. Description of the Prior Art

A patentability investigation was conducted and the following U.S. Patents were discovered:

U.S. Patent No. 4,163,349 to Smith; U.S. Patent No. 4,284,447 to Dickens et al.; U.S. Patent No. 4,602,466 to Larson; U.S. Patent No. 4,774,794 to Grieb; U.S. Patent No. 4,813,193 to Altizer; U.S. Patent No. 4,856,244 to Clapp; U.S. Patent No. 4,862,660 to Raymond; U.S. Patent No. 4,981,003 to McCarthy; U.S. Patent No. 5,021,108 to Bergqvist; U.S. Patent No. 5,245,809 to Harrington; U.S. Patent No. 5,265,389 to Mazzone et al.; U.S. Patent No. 5,269,109 to Gulur; and U.S. Patent No. 5,279,089 to Gulur.

U.S. Patent No. 4,163,349 to Smith teaches an insulated building panel having a core and overlapping skins which include an interior skin and an exterior skin. The interior skin at the panel's bottom covers a panel foot plate and the exterior skin at the panel's bottom also covers the panel foot plate and extends beyond to form an erection stop. End panels have relieved core areas for receiving bearing members

associated with a wall splice bearing post, and double parallel spaced header beams have an offset splice area within a several panel wall section.

U.S. Patent No. 4,284,447 to Dickens et al. teaches a method of forming a panel structure useful in building construction and the like including the steps of heating a heat expandable plastic in a separable mold having a cavity with the configuration of the resultant panel to form a panel core and adhering thin reinforcing strips to the front and back surfaces of the core. Control over the dimensions and configuration of the panel to Dickens et al. is obtained by adhering the strips to the core in the mold while applying heat thereto whereby core shrinkage is minimized.

U.S. Patent No. 4,602,466 to Larson teaches a method and apparatus for making building panels, including a means for positioning upper and lower rigid sheets of material, such as paper pulp, in spaced relation so that foamable material disposed between the sheets can move into gripping engagement with both sheets as it expands and solidifies.

U.S. Patent No. 4,774,794 to Grieb teaches a foam-cement building having the walls, roof and/or floor formed from a plurality of self supporting foam building blocks of varying density with a strong thin continuous structural and architectural coating on the surface of the blocks. The coating is formed from cement, reinforced with a fiberglass mesh and fiberglass roving strands. The blocks are interconnected by a mechanical key system or splines to form a monolithic structure.

U.S. Patent No. 4,813,193 to Altizer teaches an improved modular building comprising sidewall modules and ceiling modules. The sidewall modules comprise a primary frame to which a secondary frame of furring strips is attached. The sidewall modules further comprise foam insulation molded around the primary and secondary frame to define exterior and interior planar surfaces. The ceiling modules include frame means supporting a plurality of ceiling joists, and foam insulation dispersed within the frame means and between the

ceiling joist so as to define upper and lower ceiling surfaces.

U.S. Patent No. 4,856,244 to Clapp teaches tilt-wall concrete panels adapted for constructing small buildings with "finished" interiors, especially single-family residences, etc. A peripheral frame of wooden members is laid on top of a barrier film of plastic (e.g. 4 mil polyethylene) on a horizontal surface. Wood-like studs are then placed within the frame and nailed thereto. Any desired utility cables and service pipes are positioned within the frame. Clapp further teaches that an insulating foam cover, preferably high-density polyurethane, is then generated within and over the frame, to a depth that at least covers the wood-like studs and any utility or service lines. Foam having a thickness of about 1.5 inches covers these elements and bonds them securely together as a stable, easily movable "plate" after the foam plastic has hardened. A plurality of such plates, each sized to form a part of a building's wall, are positioned at a construction site where a foundation has been prepared. Clapp discloses that a concrete form is then temporarily completed around each plate, and concrete is poured on top thereof, to an average depth of about 4 to 6 inches. After the concrete hardens, the temporary form is removed and the composite panel is tilted to a vertical position. A plurality of such panels by Clapp are positioned edge-to-edge and joined to form a continuous outer wall for the building. The plastic barrier film is removed from the face of each panel, and interior wallboards or the like may be nailed to the exposed wood-like studs.

U.S. Patent No. 4,862,660 to Raymond teaches an integral energy efficient load-bearing exterior wall fabricated of lightweight foam surrounding plastic load-bearing columns. Raymond discloses prefabricated modular wall panels as individual building elements and as part of an integrated building system. The prefabricated modular wall panels are made from a foamed material that is molded around a plurality of vertically disposed hollow support columns. Each of the columns in U.S. Patent No. 4,862,660 to Raymond is taught as

containing a pair of opposed and vertically disposed T-shaped fastening supports which are arranged to form part of the interior and exterior surfaces of the foamed wall. The hollow columns are set onto locking base plates which are mounted on a wood or concrete deck system. Locking top plates are also mounted on wood and are then placed on top of the columns. The tubular columns are made of a plastic material and are shaped in cross-section in the form of a rectangle, square, diamond, oval or circle.

U.S. Patent No. 4,981,003 to McCarthy teaches a wall panel constructed from expanded polystyrene beads in an expanded polystyrene mold with structural members embedded in it during the molding process. The structural members are in the form of two by four studs placed at sixteen inch centers. Adjacent panels have interlocking grooves and ridges which fit together. McCarthy teaches that an advantage of his invention is that a total insulated wall is created with no cracks or spaces in the insulation.

U.S. Patent No. 5,021,108 to Bergqvist teaches an apparatus for manufacture of laminated panels having a foamed plastic core material including an inclined press having a fixed platen surface and a movable platen surface hinged adjacent to its lower edge. Panel thickness is adjustable by a mechanism which moves the hinge pivot relative to fixed platen surfaces. The platen surfaces in U.S. Patent No. 5,021,108 to Bergqvist are clamped at their upper edges by spaced clamps operable by lever and crank assemblies. A retractable seal spacer has liquid plastic injection nozzles and gas venting tubes in fluid communication with a hollow cavity in the press.

U.S. Patent No. 5,245,809 to Harrington teaches a panel for providing walls, roofs and floors with thermal insulation and fire retardance. The panel is taught to comprise at least two essentially parallel face members separated to form a space between the face members and urethane within the space to provide the thermal insulation and fire retardance. The panel may additionally include frame members extending between the face members for providing support and for enclosing the

urethane. At least one of the frame members has at least one port through which urethane foam can enter between the face members. U.S. Patent No. 5,245,809 to Harrington further teaches a method for creating a panel for providing insulated and fire retardant walls, floors and roofs. The method is taught by Harrington to include the steps of joining frame members together to form a panel frame of the desired dimensions, attaching face members to either side of the panel frame so that at least one enclosed space is formed within the face members and frame members, creating at least one port leading into the at least one enclosed space, and injecting urethane foam through the at least one port into the at least one enclosed space.

U.S. Patent No. 5,265,389 to Mazzone et al. teaches a composite building panel including a core of a foamed polymeric insulating material, such as expanded polystyrene, having a plurality of uniformly spaced open box tubes retained in vertical grooves formed in the rear surface of the core by a two-part epoxy adhesive. The tubes are mechanically connected at their ends to one leg of continuous horizontal channels having their other leg adhesively secured to the core at horizontal slots. The front surface of the core is continuous without seams and may be coated with a variety of exterior insulation finishing system coatings.

U.S. Patent Nos. 5,269,109 and 5,279,089 to Gulur teach an insulated load bearing wall comprising panels of extruded polymer foam into which tubular, load carrying frame members have been incorporated. A tongue is formed at one vertical edge of each panel and a groove is formed at the opposite vertical edge. The tubular frame members are bonded to the extruded polymer foam.

None of the foregoing U.S. Patents teach the particular methods of the present inventions for producing panels having a core of a foamed polymeric material, such as expanded polystyrene. StressSkin and Structural Panels have been in use for several decades. Alden Dow constructed his first StressSkin panel house in the late forties. Both technologies have relied on an inner and outer skin of wood either being

plywood or more recently OSB (oriented strand board). The plywood or OSB skin is attached to the foam core with an adhesive and then pressed together. The laminated panels are thereafter processed into engineered parts. The plywood or OSB skin does not provide for both a structure and a substrate for the interior and exterior finishes. Thus, what is needed and what has been invented by us is a foamed wall system and method that provides for a foamed polymeric material that becomes both a structure and a substrate for the interior and exterior finishes.

EXHIBIT "E" 44-1000

Summary Of The Invention

The present invention accomplishes its desired objects by providing a method for producing a polymeric foamed material panel (e.g. a low density synthetic panel) comprising the steps of:

- (a) providing a polymeric foamed material;
- (b) cutting the polymeric foamed material of step (a) until reaching a preconfiguration cut point;
- (c) cutting subsequently from the preconfiguration cut point a brace-receiving configuration in the polymeric foamed material; and
- (d) sliding a brace member into the brace-receiving configuration to produce a polymeric foamed material panel.

The cutting in step (b) and the cutting in step (c) comprises cutting the polymeric foamed material of step (a) with a hot wire cutter which is preferably operated by a computer. The brace-receiving configuration in the polymeric foamed material comprises a slot for receiving the brace member. The slot includes a seared wall for facilitating the sliding of the brace member. The brace member includes an opening with an opening perimeter. The method additionally comprises forming a polymeric foamed material opening in the polymeric foamed material. The polymeric foamed material opening has a polymeric foamed material opening perimeter. The sliding in step (d) comprises sliding the brace member into the brace-receiving configuration until the opening of the brace member is generally aligned with the polymeric foamed material opening. The opening perimeter of the opening in the brace member has a dimension that is greater than a dimension of the polymeric foamed material opening perimeter of the polymeric foamed material opening in the polymeric foamed material.

The method preferably additionally comprises passing a conduit through the polymeric foamed material opening of the polymeric foamed material and through the opening of the brace member; preferably such that the conduit is essentially supported by the polymeric foamed material and essentially

does not contact any of the opening perimeter of the opening in the brace member. The cutting in step (b) further comprises cutting a generally straight thread-like slot from a defined surface of the polymeric foamed material to the preconfiguration cut point. The brace-receiving configuration is essentially a generally C-shaped slot. The method preferably includes that the cutting in step (b) and the cutting in step (c) is with a hot wire cutter wherein the hot wire cutter is at a temperature (e.g. 230°F to 580°F) such as to sear at least one wall of the C-shaped slot to smooth and harden the wall of the C-shaped slot for facilitating the sliding in step (d) of the brace member. The polymeric foamed material may be any suitable material (i.e. either low density and/or high density including engineered resins) that is capable of producing the panel or structure of the present invention, such as expanded polystyrene (EPS).

The present invention further accomplishes its desired objects by providing a method for forming a structure comprising the steps of:

- (a) providing a first polymeric foamed material having a first defined edge;
- (b) cutting the first polymeric foamed material until receiving a first preconfiguration cut point and cutting subsequently from the first preconfiguration cut points a first brace-receiving-configured slot in the first polymeric foamed material;
- (c) cutting the first defined edge of the first polymeric foamed material to form a tongue on the first defined edge;
- (d) sliding a first brace member into the first brace-receiving-configured slot;
- (e) providing a second polymeric foamed material having a second defined edge;
- (f) cutting the second polymeric foamed material until reaching a second preconfiguration cut point and cutting subsequently from the second preconfiguration cut point a second brace-receiving-

configured slot in the second polymeric foamed material;

- (g) cutting the second defined edge of the second polymeric foamed material to form a channel in the second defined edge;
- (h) sliding a second brace member into the second brace-receiving-configured slot; and
- (i) sliding the tongue on the first defined edge of the first polymeric foamed material into the channel in the second defined edge of the second polymeric foamed material to form a structure.

The cutting in steps (b), (c), (f) and (g) comprises cutting with a hot wire cutter; preferably a computer operated hot wire cutter. The first brace-receiving-configured slot in the first polymeric foamed material and the second brace-receiving-configured slot in the second polymeric foamed material respectively comprise a first slot with a first wall for receiving the first brace member and a second slot with a second wall for receiving the second brace member. The first wall of the first slot includes a first seared wall for facilitating the sliding of the first brace member and the second wall of the second slot includes a second seared wall for facilitating the sliding of the second brace member. The first brace member includes a first opening with a first opening perimeter and the second brace member includes a second opening with a second opening perimeter.

The method additionally includes forming a first polymeric foamed material opening in the first polymeric foamed material and forming a second polymeric foamed material opening in the second polymeric foamed material. The first polymeric foamed material opening includes a first polymeric foamed material opening perimeter and the second polymeric foamed material opening includes a second polymeric foamed material opening perimeter. The sliding step (d) comprises sliding the first brace member into the first brace-receiving-configured slot until the first opening of the first brace member is generally aligned with the first polymeric foamed materials opening; and the sliding step (h)

comprises sliding the second brace member into the second
brace-receiving-configured slot until the second opening of
the second brace member is generally aligned with the second
polymeric foamed material opening. The first and second
5 openings of the first and second brace members and the first
and second polymeric foamed material openings of the first and
second polymeric foamed materials are all aligned for
receiving a conduit. The first opening perimeter of the first
opening in the first brace member has a first dimension that
10 is greater than a first dimension of the first polymeric
foamed material opening perimeter of the first polymeric
foamed material opening in the first polymeric foamed
material; and the second opening perimeter of the second
opening in the second-brace member has a second dimension that
15 is greater than a second dimension of the second polymeric
foamed material opening perimeter of the second polymeric
foamed material opening in the second polymeric foamed
material.

The method preferably additionally comprises passing a
20 conduit through the first polymeric foamed material opening in
the first polymeric foamed material and through the first
opening of the first brace member and further passing the
conduit through the second polymeric foamed material opening
in the second polymeric material and through the second
25 opening of the second brace member; preferably such that the
conduit is essentially supported by the first polymeric foamed
material and by the second polymeric material and essentially
does not contact any of the first opening perimeter of the
first opening in the first brace member and any of the second
30 opening perimeter of the second opening in the second brace
member.

The method also preferably additionally comprises
cutting, prior to the cutting in step (b), a first generally
straight thread-like slot in the first polymeric foamed
35 material up to a first preconfiguration cut point wherein the
step (b) cutting commences; and further also preferably
additionally comprises cutting, prior to the cutting in step
(f), a second generally straight thread-like slot in the

second polymeric foamed material up to a second preconfiguration cut point wherein the step (f) cutting commences. The first brace-receiving-configured slot is essentially a first generally C-shaped slot and the second
 5 brace-receiving-configured slot is essentially a second generally C-shaped slot. The cutting in step (b), step (c), step (f), and step (g) comprises cutting with a hot wire cutter which is at a temperature (e.g. 230°F to 580°F) such as to sear at least one wall of the first C-shaped slot and to
 10 sear at least one wall of the second C-shaped slot to smooth and harden the wall of the first C-shaped slot and to smooth and harden the wall of the second C-shaped slot for facilitating the sliding in step (d) of the first brace member and for facilitating the sliding in step (h) of the second
 15 brace member. The first polymeric foamed material and the second polymeric foamed material both may consist of any suitable material (e.g. any suitable polymeric foamed material) such as that comprising expanded polystyrene (EPS).

The present invention therefore provides a method for
 20 producing a polymeric foamed material panel comprising the steps of:

- (a) providing a polymeric foamed material in a generally stationary position;
- (b) cutting the generally stationary polymeric foamed
 25 material of step (a) until reaching a preconfiguration cut point;
- (c) cutting subsequently from the preconfiguration cut point a brace-receiving configuration in the generally stationary polymeric foamed material; and
- (d) sliding a brace member into the brace-receiving
 30 configuration to produce a polymeric foamed material panel.

The present invention further therefore provides a method for producing a polymeric foamed material panel comprising the
 35 steps of:

- (a) providing a polymeric foamed material;
- (b) providing a brace member with brace sides;

- (c) cutting a brace-receiving configuration in the polymeric foamed material; and
- (d) sliding the brace member of step (b) into the brace-receiving configuration such that the brace sides are essentially surrounded by the polymeric foamed material to produce a polymeric foamed material panel.

The present invention also further therefore provides a method for producing a polymeric foamed material panel comprising the steps of:

- (a) providing a polymeric foamed material with a planar side surface;
- (b) cutting with a cutter from the planar side surface a path in the polymeric foamed material of step (a);
- (c) retracing the path of step (b) with the cutter to produce a brace-receiving configuration in the polymeric foamed material; and
- (d) sliding a brace member into the brace-receiving configuration to produce a polymeric foamed material panel.

The present invention yet also further therefore provides a method for producing a polymeric foamed material panel comprising the steps of:

- (a) providing a polymeric foamed material with a planar side surface;
- (b) contacting the planar side surface with a cutter;
- (c) cutting with the cutter the polymeric foamed material from the planar side surface thereof until reaching a preconfiguration cut point within the polymeric foamed material;
- (d) cutting with the cutter from the preconfiguration cut point of step (c) a slot in the polymeric foamed material of step (c);
- (e) cleaning the slot of step (d) with the cutter to produce a brace-receiving configuration in the polymeric foamed material; and

- (f) sliding a brace member into the brace-receiving configuration to produce a polymeric foamed material panel.

In addition to the foregoing methods, the present invention provides at least one polymeric foamed material panel. The polymeric foamed material panel of the present invention comprises a panel consisting of a polymeric foamed material. A brace-receiving-configured slot is disposed in the polymeric foamed material of the panel and a brace member is disposed in the brace-receiving-configured slot in the polymeric foamed material of the panel. The brace-receiving-configured slot preferably includes at least one seared wall; and the polymeric foamed material panel additionally comprises a generally straight thread-like slot extending from a defined surface of the polymeric foamed material to the brace-receiving-configured slot; and a second generally straight thread-like slot extending from the defined surface of the polymeric foamed material to a generally cylindrical opening in the polymeric foamed material. The brace member has a brace opening which is generally aligned with the cylindrical opening in polymeric foamed material.

In another embodiment of the present invention there is provided a method for forming a structure comprising the steps of:

- (a) providing a first polymeric foamed material having a first defined edge;
- (b) cutting (e.g. with a hot wire cutter or a laser cutter) a first slot in the first polymeric foamed material;
- (c) providing a first internal reinforcing member having a male member;
- (d) sliding the first internal reinforcing member of step (c) into the first slot of step (b) such that the male member protrudes from the first defined edge;
- (e) providing a second polymeric foamed material having a second defined edge;

5

10

15

20

25

30

35

The immediate foregoing method additionally comprises cutting with each cutter, prior to the cutting step (d), a respective polymeric foamed material opening in the polymeric

foamed material such that each polymeric foamed material structure has a polymeric foamed material opening to define a chase. The cutters are preferably computer operated to provide desired cut accuracy.

5 In yet another embodiment of the present invention, there is also provided a method for producing a plurality of polymeric foamed material panels comprising the steps of:

(a) providing a block (e.g., a generally stationary block) of polymeric foamed material (e.g.,
10 expanded polystyrene (EPS));

(b) cutting the polymeric foamed material of step (a) with a plurality of cutters (e.g., hot wire cutters, laser cutter, etc.) until each cutter reaches a respective preconfiguration cut point;

15 (c) cutting subsequently with each cutter from the respective preconfiguration cut point of each cutter a respective brace-receiving slot in the polymeric foamed material;

(d) cutting, after the cutting step (c), the
20 polymeric foamed material of step (c) with said plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of brace-receiving slots, which may be linear or nonlinear slots; and

(e) sliding a plurality of brace members into
25 the brace-receiving slots of the polymeric foamed material structures of step (d) to produce a plurality of polymeric foamed material panels, each of the polymeric foamed material panels having at least one of the brace members.

30 In the immediate foregoing method of the present invention, the brace members include sides. More particularly, each of the brace members preferably comprises a web, a first flange integrally bound to the web, a first flange return integrally bound to the first flange, a second
35 flange also integrally bound to the web, and a second flange return integrally bound to the second flange. The web, the first and second flanges, and the first and second flange returns are surrounded by the polymeric foamed materials.

Alternatively and as another embodiment of the present invention, a portion of at least one brace member protrudes from each of the polymeric foamed material panels. Therefore, the sliding step (e) in the immediate foregoing method more specifically comprises sliding the first flange and the first flange return and a portion of the web of respective brace members into respective brace-receiving slots of the polymeric foamed material structures to produce the plurality of polymeric foamed material panels, with each of the polymeric foamed material panels having the second flange and the second flange return and a portion of the web of at least one of the brace members disposed outside thereof.

An alternative embodiment of the present invention further also provides a method for producing a plurality of polymeric foamed material structures having slots for receiving stud members comprising the steps of:

(a) cutting a polymeric foamed material (e.g., a generally stationary block of expanded polystyrene (EPS)) with a plurality of cutters, such as hot wire cutters or laser cutters, in a first direction;

(b) cutting subsequently in a second direction the polymeric foamed material of step (a) with the plurality of cutters until each cutter forms a first respective slot in the polymeric foamed material;

(c) cutting, after the cutting step (b), in the first direction the polymeric foamed material of step (b) with the plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of first slots, which may be linear or nonlinear slots.

The immediately foregoing method broadly additionally comprises cutting, prior to the cutting step (c), the polymeric foamed material of step (b) with the plurality of cutters until each cutter forms a second respective slot in the polymeric foamed material. The immediate foregoing method more particularly additionally comprises cutting, prior to the cutting step (c), the polymeric foamed material of step (b) with the plurality of cutters until each cutter forms a

respective recess in the polymeric foamed material; and
 subsequently cutting, prior to the cutting step (c), the
 polymeric foamed material with the plurality of cutters until
 each cutter forms a second respective slot in the polymeric
 foamed material such that after the cutting step (c), a
 plurality of polymeric foamed material structures are produced
 having a plurality of first slots and a plurality of second
 slots and a plurality of recesses. A plurality of stud
 members is provided wherein each of the stud members comprises
 a web, a first flange integrally bound to the web, a first
 flange return integrally bound to the first flange, a second
 flange also integrally bound to the web, and a second flange
 return integrally bound to the second flange. The stud
 members are slid into the first and second slots and into the
 recesses of the polymeric foamed material structures, such
 that after the sliding step, the first flange return and the
 first flange of each of the stud members occupies respectively
 one of the first slots and one of the recesses of the
 polymeric foamed material structures, and the web, the second
 flange and the second flange return of each of the stud
 members occupies one of the second slots of the polymeric
 foamed material structures. The cutters are preferably
 computer operated to provide the desired cut accuracy during
 the cutting steps.

The alternative embodiment of the present invention more
 specifically includes a method for producing a plurality of
 polymeric foamed material structures having slots for
 receiving stud members comprising the steps of:

(a) cutting a polymeric foamed material with a
 plurality of cutters in a first direction until each of
 the cutters has moved a respective first distance in the
 polymeric foamed material;

(b) cutting subsequently with the plurality of
 cutters in a second direction the polymeric foamed
 material of step (a) until each of the cutters has moved
 a respective second distance in the polymeric foamed
 material of step (a);

(c) cutting subsequently with the plurality of cutters in the first direction the polymeric foamed material of step (b) until each of the cutters has moved a respective third distance in the polymeric foamed material of step (b);

(d) cutting subsequently with the plurality of cutters in a third direction the polymeric foamed material of step (c) until each of the cutters has moved a respective fourth distance in the polymeric foamed material of step (c);

(e) cutting subsequently with the plurality of cutters in the first direction the polymeric foamed material of step (d) until each of the cutters has moved a respective fifth distance in the polymeric foamed material of step (d);

(f) cutting subsequently with the plurality of cutters in the second direction the polymeric foamed material of step (e) until each of the cutters has moved a respective sixth distance in the polymeric foamed material of step (e);

(g) cutting subsequently with the plurality of cutters in a fourth direction the polymeric foamed material of step (f) until each of the cutters has moved a respective seventh distance in the polymeric foamed material of step (f);

(h) cutting subsequently with the plurality of cutters in the third direction the polymeric foamed material of step (g) until each of the cutters has moved a respective eighth distance in the polymeric foamed material of step (g);

(i) cutting subsequently with the plurality of cutters in the fourth direction the polymeric foamed material of step (h) until each of the cutters has moved a respective ninth distance in the polymeric foamed material of step (h);

(j) cutting subsequently with the plurality of cutters in the second direction the polymeric foamed material of step (i) until each of the cutters has moved

is not a reference

a respective tenth distance in the polymeric foamed material of step (i);

(k) cutting subsequently with the plurality of cutters in the first direction the polymeric foamed material of step (j) until each of the cutters has moved a respective eleventh distance in the polymeric foamed material of step (j);

(l) cutting subsequently with the plurality of cutters in the third direction the polymeric foamed material of step (k) until each of the cutters has moved a respective twelfth distance in the polymeric foamed material of step (k); and

(m) cutting, after the cutting step (l), in the first direction the polymeric foamed material of step (l) with the plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of slots.

In the immediate foregoing method, the respective third distance and the respective eighth distance are approximately equal. Similarly, the respective fifth distance and the respective seventh distance are approximately equal. The respective fourth distance is generally less than the respective second distance, and the respective eighth distance is generally less than the respective tenth distance. The third direction is generally opposite to the second direction, and the fourth direction is generally opposite to the first direction. The cutters are preferably computer operated hot wire cutters which generally move in unison. Each of the hot wire cutters includes a wire diameter with a generally known diameter measurement which generally equals the respective third distance and the respective eighth distance.

One of the alternative embodiments of the present invention also more specifically includes a method for producing a plurality of polymeric foamed material structures comprising the steps of:

(a) cutting a polymeric foamed material (e.g., a generally stationary block of expanded polystyrene (EPS)) with a plurality of cutters (e.g., computer-

operated hot wire cutters or laser cutters) until each cutter reaches a respective first cut point;

(b) cutting subsequently with each cutter from the respective first cut point a respective path in the polymeric foamed material of step (a) until each cutter reaches a respective second cut point;

(c) moving each of the plurality of cutters from the respective second cut point to a respective off-set position in the polymeric foamed material of step (b);

(d) retracing generally with each cutter the respective path of each cutter, while each cutter remains in the respective off-set position of step (c) such that a respective slot is formed by each cutter in the polymeric foamed material of step (c); and

(e) cutting the polymeric foamed material of step (d) with the plurality of cutters until the cutters have cut through the polymeric foamed material of step (d), producing a plurality of polymeric foamed material structures having slots, which may be either linear or non-linear slots. The method additionally comprises cutting with the plurality of cutters track chases in the polymeric foamed material structures of step (e) such that each of the plurality of polymeric foamed material structures additionally includes a track chase.

Other features of the alternative embodiments of the present invention include interrupting the movement of a plurality of cutters in a first direction of travel to move the cutters in at least one direction of travel which differs from the first direction of travel in order to form one or more brace-receiving slots. These features are embodied in a method for producing a plurality of polymeric foamed material structures having brace-receiving slots comprising the steps of: (a) providing a block of polymeric foamed material; and (b) moving a plurality of cutters through the block of polymeric foamed material in a first direction of travel, while interrupting at least one time the moving of the plurality of cutters in the first direction of travel to move

the cutters through the block of polymeric foamed material in at least one direction of travel which differs from the first direction of travel, such that each cutter produces a respective brace-receiving slot in the polymeric foamed material, until the plurality of cutters have moved completely through the block of polymeric foamed material to produce a plurality of polymeric foamed material structures with each structure having at least one brace-receiving slot. These features are also embodied in a method for producing a plurality of polymeric foamed material structures having brace-receiving slots comprising the steps of: (a) providing a block of polymeric foamed material in a generally stationary position; (b) moving a plurality of cutters through the generally stationary block of polymeric foamed material of step (a) in a first direction of travel; (c) interrupting the movement of the plurality of cutters from the first direction of travel through the generally stationary block of polymeric foamed material to move the cutters in at least one direction of travel which differs from the first direction of travel such that each cutter produces a respective brace-receiving slot in the polymeric foamed material, and (d) continuing the moving step (b) of the plurality of cutters in the first direction of travel, while intermittently interrupting the movement of the plurality of cutters from the first direction of travel to move the cutters in at least one direction of travel which differs from the first direction of travel such that each cutter produces at least one additional respective brace-receiving slot in the polymeric foamed material, until the plurality of cutters have moved completely through the generally stationary block of polymeric foamed material after which a plurality of polymeric foamed material structures are produced with each polymeric foamed material structure having a plurality of brace-receiving slots.

An alternative embodiment of the present invention therefore accomplishes its desired objects by broadly providing a method for producing a plurality of polymeric foamed material panels comprising the steps of:

(a) cutting a polymeric foamed material in a first direction with a plurality of cutters generally moving in unison;

(b) cutting subsequently the polymeric foamed material of step (a) in a second direction with the plurality of cutters generally moving in unison;

(c) cutting, after the cutting step (b), the polymeric foamed material of step (b) in the first direction with the plurality of cutters generally moving in unison;

(d) cutting, after the cutting step (c), the polymeric foamed material of step (c) in a third direction with the plurality of cutters generally moving in unison wherein the third direction is generally opposite to the second direction;

(e) cutting, after the cutting step (d), the polymeric foamed material of step (d) in the first direction with the plurality of cutters generally moving in unison until the cutters have cut through the polymeric foamed material of step (d) to produce a plurality of polymeric foamed material structures having brace-receiving configurations; and

(f) sliding brace members into the brace-receiving configurations of the polymeric foamed material structures of step (e) to produce a plurality of polymeric foamed material panels with each polymeric foamed material panel having one of the brace members.

An alternative embodiment of the present invention also accomplishes its desired objects by broadly providing a method for producing a polymeric foamed material structure having a slot comprising the steps of:

(a) cutting with a cutter a polymeric foamed material until reaching a preslot cut point;

(b) cutting subsequently a first path in the polymeric foamed material with the cutter from the preslot cut point until reaching a first cut point;

5

10

15

20

25

30

35

35

(e) cutting subsequently the polymeric foamed material of step (d) with the cutter until the cutter has cut through the polymeric foamed material of step (d),

producing at least one polymeric foamed structure having at least one slot.

In the immediate foregoing method for an improved embodiment of the present invention, the at least one
5 respective path has at least one respective path length, and the at least one respective off-set path communicates with the at least one respective path along the at least one respective path length of the at least one respective path, such that the at least one respective path and the least one respective off-
10 set path together form the at least one slot within the polymeric foamed material of step (c). Preferably, the at least one cutter comprises a plurality of computer-operated hot wire cutters cutting a plurality of respective paths in the polymeric foamed material of step (b) and forming a
15 plurality of respective off-set paths in the polymeric foamed material of step (c), such that the plurality of respective paths and the plurality of respective off-set paths together form a plurality of respective slots in the polymeric foamed material of step (c), and such that, after the cutting step
20 (e) with the plurality of hot wire cutters, a plurality of polymeric foamed structures are produced having a plurality of slots. A plurality of stud members are slid into the plurality of slots.

It is therefore an object of the present invention to
25 provide a method for producing a polymeric foamed material panel.

It is another object of the present invention to provide a method for forming a polymeric foamed material structure.

It is yet further an object of the present invention to
30 provide a polymeric foamed material panel.

These, together with the various ancillary objects and features which will become apparent to those skilled in the art as the following description proceeds, are attained by these novel methods and polymeric foamed material panels, a
35 preferred embodiment being shown with reference to the accompanying drawings, by way of example only, wherein:

Brief Description Of The Drawings

Fig. 1 is a perspective view of a polymeric foamed material panel produced in accordance with the method of the present invention;

Fig. 2 is a partial perspective view of a structure consisting of standard trusses and polymeric foamed material panels forming walls and roofs;

Fig. 2A is another partial perspective view of a structure similar to the partial perspective view in Fig. 2 wherein the structure includes standard trusses and polymeric foamed material panels forming walls and roofs;

Fig. 3 is a partial perspective view of a polymeric foamed material panel including a brace member having an opening with a conduit supported by the polymeric foamed material and passing through the opening of the brace member without contacting any of the circumference or perimeter of the opening of the brace member;

Fig. 4 is a partial perspective view of two panel members disposed contiguous to each other and encapsulated in sheetrock or the like;

Fig. 5 is a top plan view of the pair of contiguous panel members of Fig. 4 encapsulated in sheetrock or the like;

Fig. 6 is a top plan view of a panel member having a plurality of steel studs or brace members disposed therein with the inside wall thereof covered with sheetrock and further having a tongue member at one end and a channel member at another end;

Fig. 7 is a perspective view of the hot wire cutter mounted on a table and operated by a computer;

Fig. 8 is a schematic diagram of the various process steps in producing the panel member of the present invention;

Fig. 9 is a perspective view of a hot wire cutter having cut through the polymeric foam material to a point where a subsequent general C-shaped slot is to be cut by the hot wire cutter, the C-shaped slot to be cut being represented by dotted lines;

Fig. 10 is a perspective view of the polymeric foamed material after a pair of C-shaped slots have been cut with the

hot wire cutter and after the polymeric foam material has been rotated, with a hot wire cutter having cut a general cylindrical opening in the polymeric foam material transverse to the C-shaped slots, leaving a residual core material in the transverse opening; and further illustrating a metallic U-shaped stud in proximity to one of the C-shaped slots for being slid into the same;

Fig. 11 is an end elevational view of the residual core material being removed from the cylindrical opening in the polymeric foam material and with a conduit aligned with the cylindrical opening in order to be slid subsequently therein;

Fig. 12 is vertical sectional view of the polymeric foam material supporting a conduit while the conduit passes through an opening in the brace or stud member without touching any of the circumference or perimeter of the stud or brace member;

Fig. 13 is a partial perspective view of two polymeric foamed material panel members with ends of the two polymeric foamed material panel members being generally aligned such that the tongue on one end of one panel member may slid into a channel in one of the ends of the other panel member;

Fig. 14 is a partial vertical sectional view taken in direction of the arrows and along the plane of line 14-14 in Fig. 8 ;

Fig. 14A is a vertical sectional view taken in direction of the arrows and along the plane of line 14A-14A in Fig. 14;

Fig. 15 is a perspective view of a plurality of hot wire cutters cutting through a block of polymeric foamed material to produce a plurality of polymeric foamed structures having slots for receiving brace or stud members and having chases (or polymeric openings) wherethrough conduits pass;

Fig. 16 is a perspective view of a table assembly supporting a block of polymeric foamed material with a plurality of hot wire cutters passing and cutting through the polymeric foamed material block, and with the vertical and horizontal movement of the hot wire cutters being respectively controlled by a motor (M_v) for controlling the vertical movement of the plurality of hot wire cutters and by a motor (M_H) for controlling the horizontal movement of the plurality

of hot wire cutters, wherein power to the motors M_v and M_h is allocated or metered from a CNC controller which receives signals from a computer;

Fig. 17 is an enlarged partial perspective view of a horizontal trolley supporting a vertical support of a harp and slidably engaged to a horizontal trolley track supported by the table assembly, and of a vertical trolley slidably mounted to the vertical support of the harp with a hot wire cutter coupled to the vertical trolley, such that the horizontal trolley can move the hot wire cutter in a horizontal direction and the vertical trolley can move the hot wire cutter in a vertical direction;

Fig. 18 is a schematic block diagram of the computer control assembly for controlling the plurality of hot wire cutters illustrating a computer, a CNC controller electrically engaged to the computer for receiving signals therefrom, a power box communicating with a power source and electrically engaged to the CNC controller to supply power to the CNC controller, and a pair of motors (M_v and M_h) electrically engaged to the CNC controller for receiving metered or allocated power from the CNC controller to control the vertical and horizontal movement of the plurality of hot wire cutters;

Fig. 19 is an end elevational view of a plurality of polymeric foamed structures produced after a plurality of computer-controlled hot wire cutters have passed through a block of polymeric foamed material;

Fig. 20 is an end elevational view of a polymeric foamed structure having a slot formed therein with a hot wire cutter with arrows representing directions and paths that the hot wire cutter travelled in forming the slot;

Fig. 20A is an enlarged end elevational view of the polymeric foamed structure of Fig. 20 with a stud or brace member lodged in the slot;

Fig. 20B is an end elevational view of a pair of polymeric foamed material structures which were integrally bound to each other before being severed, with one polymeric foamed material structure having a polymeric material recess

and with the other polymeric foamed material structure having a polymeric material crest which may serve as a benchmark or indicator for a brace member when the brace member is lodged in a slot located immediately below the polymeric material crest;

Fig. 21 is an exploded detail view of a section of the slot of Fig. 20 with the hot wire cutter being shown in a dotted line representation and with the arrows showing the directions and paths of travel for the hot wire cutter;

Fig. 22 is an exploded detail view of another section of the slot of Fig. 20 with the hot wire cutter being shown again in a dotted line representation and with the arrows showing again the directions and paths of travel for the hot wire cutter;

Fig. 23 is an enlarged view of the detail view of Fig. 21 with "W" indicating the width of the slot and "D" indicating the diameter of the hot wire cutter;

Fig. 24 is an enlarged view of the detail view of Fig. 22;

Fig. 25 is an end elevational view of a polymeric foamed material structure produced from a block of polymeric foamed material and after a hot wire cutter has cut a plurality of slots (i.e., C-brace chases), a polymeric opening (i.e., a wiring chase), and a track chase in the polymeric foamed material structure;

Fig. 26 is another end elevational view of a polymeric foamed material structure produced from a block of polymeric foamed material and after a hot wire cutter has cut in the polymeric foamed material a plurality of slots or chases for receiving brace or stud members, a polymeric opening or wiring chase for receiving a conduct, and a track chase for receiving a track member;

Fig. 27 is an end elevational view of the polymeric foamed material structure of Fig. 26 after brace or stud members (i.e., C-shaped braces or studs) have been slid into the plurality of slots or chases such that a portion of the brace members protrude from the polymeric foamed material structure;

Fig. 28 is an end elevational view of the polymeric foamed material structure of Fig. 27 after a track member has been slid into the track chase and over the ends of the brace or stud members;

Fig. 28A is a vertical sectional view taken in direction of the arrows and along the plane of line 28A-28A in Fig. 28;

Fig. 28B is a vertical sectional view taken in direction of the arrows along the plane of line 28B-28B in Fig. 28;

Fig. 29 is an end elevational view of a polymeric foamed material structure produced from the block of polymeric foamed material and after a hot wire cutter has cut a plurality of slots or chases and a track chase in the polymeric foamed material structure;

Fig. 30 is an end elevational view of the polymeric foamed material structure of Fig. 29 after a plurality of Z-shaped studs or braces have been inserted into the slots or chases such that a portion of the Z-shaped studs or braces protrudes from the polymeric foamed material structure;

Fig. 31 is an end elevational view of the polymeric foamed material structure in Fig. 30 after a track member has been inserted into the track chase and over the ends of the Z-shaped studs or brace members;

Fig. 32 is an enlarged partial perspective view of an end of a polymeric foamed material structure after a hot wire cutter has cut a plurality of C-shaped slots in the polymeric foamed material structure and after a polymeric opening (i.e. a wiring chase) has also been cut in the polymeric foamed material structure by the hot wire cutter;

Fig. 33 is a partial perspective view of an end of a polymeric foamed material panel having a plurality of C-shaped studs or brace members inserted within slots in a polymeric foamed material structure with a portion of the studs or brace members protruding therefrom;

Fig. 34 is a partial perspective view of an end of a polymeric foamed material panel having a plurality of studs or brace members lodged in slots produced by a hot wire cutter with a portion of each of the studs or brace members protruding from the polymeric foamed material panel;

Fig. 35 is a vertical sectional view taken in direction of the arrows and along the plane of line 35-35 in Fig. 34, illustrating a track chase which was cut in the polymeric foamed material by a hot wire cutter;

5 Fig. 36 is a perspective view of a polymeric foamed material panel having a plurality of braces embedded therein with a vertical conduit having been slid into a vertical wiring chase, and with a horizontal conduit having been slid into a horizontal wiring chase, and including an internal
10 reinforcing member lodged within a horizontal polymeric opening with a male end of the internal reinforcing member protruding from a side of the polymeric foamed material panel; and

15 Fig. 37 is a partial side elevational view of a pair of engaged polymeric foamed material panels having respective internal reinforcing members with the male end of one internal reinforcing member lodged in the female end of the other internal reinforcing member.

6607-45460

Description Of The Preferred Embodiment

Referring in detail now to the drawings wherein similar parts of the invention are identified by like reference numerals, there is seen a panel member, generally illustrated as 10, produced in accordance with the method of the present invention. The panel member 10 comprises a polymeric foamed material, generally illustrated as 12, and a plurality of stud or brace members 14 disposed in the polymeric foamed material 12. Each of the brace members 14 pass into a slot, generally illustrated as 30 (see Figs. 4 and 8), which was preferably preformed or precut. As best shown in Figs. 6 and 29, slot 30 may be non-linear. Each of the brace members 14 may be any suitable brace member such as studs, load-bearing members, etc. constructed of any suitable material (e.g. metal, wood, etc.) Most preferably, the brace members 14 are metal (e.g. a light gauge metal) studs for load-bearing and adding strength to the polymeric foamed material 12. As best shown in Figs. 1 and 6, each brace member 14 includes brace sides 14a, 14b, 14c, and 14d and 14e which are all essentially surrounded by the polymeric foamed material 12. Stated alternatively and as best shown in Figs. 33 and 34, each stud or brace member includes a web 14w, a pair of flanges 14f-14f integrally secured to the web 14w, and a pair of flange returns 14r-14r, respectively integrally bound to the respective flanges 14f-14f.

In the embodiment of the invention shown in Figs. 30 and 31, each stud or brace member 14 is generally geometrically Z-shaped with the web 14w being oblique with respect to flanges 14f-14f as opposed to being normal thereto as shown in Figs. 31 and 35. In the embodiment of the invention shown in Figs. 27, 28, 30, 31, 33 and 34 a portion of each stud or brace member protrudes from the polymeric foamed material 12. More specifically, one of the flanges 14f-14f and its associated flange return 14r, along with a portion of the web 14w, are embedded in the polymeric foamed material 12, while the remaining flange 14f and its associated flange return 14r, along with a remaining portion of the 14w, are disposed outside of the polymeric foamed material 12.

Referring now to Figs. 20 and 20A, there is seen a slot 30 communicating with a polymeric material recess 12r. Slot 30 and polymeric material recess 12r were cut in the polymeric foamed material in accordance with a cutting procedure set forth hereinafter. The slot 30 more specifically includes vertical slot section 30r₁ and a generally inverted L-shaped slot section 30_s which includes individual slot sections 30w, 30f and 30r₂. As best shown in Fig. 20, slot sections 30r₁ and 30w directly communicate with the polymeric material recess 12r. A brace member 14 lodges in slot section 30r₁, in polymeric material recess 12r, and in slot section 30s. More specifically and as best shown in Fig. 20A, one flange return 14r and one flange 14f of a brace member 14 respectively lodges in slot section 30r₁ and polymeric material access 12r, while the remaining web 14w, flange 14f and flange return 14r of the brace 14 respectively lodges in slot section 30w, slot section 30f and slot section 30r₂ of the slot section 30s.

After a polymeric material recess 12r has been cut in a polymeric foamed material 12, the polymeric foamed material 12 adjacent or contiguous to the polymeric foamed material 12 having the polymeric material recess 12r has a polymeric material crest or ridge 12c as best shown in Fig. 20B. This polymeric material crest 12c previously integrally resided within the polymeric material recess 12r, and may be either removed, such as by sanding, or be used as a benchmark or indicator for a location of a brace member 14. Referring more particularly to Fig. 20B wherein there is seen two severed polymeric foamed materials 12a and 12b, with polymeric foamed material 12a having polymeric material recess 12r and with polymeric foamed material 12b having the polymeric material crest 12c. When a brace member 14 is slid into the slot 30 of the polymeric foamed material 12b, the brace member 14 in the polymeric foamed material 12b would be immediately below (e.g. one (1) to three (3) inches below) the polymeric material crest 12c. Thus, a person looking at the planar side of polymeric foamed material 12b having the polymeric material crest 12c, and not being able to see the planar side of the polymeric foamed material 12b where the brace member 14 is

exposed, would still know that immediately below the polymeric material crest 12c lies a brace member 14. Thus, the polymeric material crest 12c may serve as a benchmark or indicator for the location of a brace member 14.

5 In the embodiment of the invention shown in Figs 25-31, 34 and 36, the polymeric foamed material 12 includes a track chase 100 (i.e., a cut slot ranging from about one-quarter ($\frac{1}{4}$) inch to about $1\frac{1}{2}$ inches in depth), as best shown in Fig. 35. A track member 102 is provided and includes a track base 104
10 with a pair of track flanges 105-106 integrally bound thereto. As best shown in Figs. 28A and 28B, one of the track flanges 106 may lodge in the track chase 100 with a portion of the track base 104 extending away from the polymeric foamed material 12 (see Fig. 28A), such that one of the track flanges
15 106 associated with the track base 104 is situated outside of the polymeric foamed material 12. The track flange 106 disposed outside of the polymeric foamed material 12 may be secured to one of the flanges 14f of the stud or brace member 14 by a screw or bolt 107 as best shown in Fig. 28B.

20 The panel member 10 may additionally include a conduit 16 also disposed in the polymeric foamed material 12, preferably transversely disposed therein and generally normal with respect to the brace members 14. The conduit 16 passes into a transverse polymeric opening 17 (see Figs. 10 and 11) in the
25 polymeric foamed material 12. In the embodiment of the invention shown in Figs. 15-35, the polymeric foamed material 12 in the panel member 10 is provided with a longitudinal (and/or vertical) polymeric opening 15 which is preferably for receiving a conduit 19 (see Fig. 36). The conduits 16 and 19
30 may be employed for any suitable use; for example, a utility receptor (e.g. electrical wires), water, gas, etc. The polymeric openings 15 and 17 as well as slot 30 are preferably formed with at least one seared or cartherized wall 32. Cartherizing and/or searing the wall(s) of the polymeric
35 openings 15 and 17 and/or slot 30 hardens and smoothes the wall(s) to facilitate the sliding of the conduits 16 and 19 and to brace member(s) 14 thereinto. As will be further

SECRET - 4450

explained below, the seared or cartherized wall 32 is preferably formed by hot wire cutting.

5 The panel member 10 may also additionally include an internal reinforcing member, generally illustrated as 23 in Fig. 36. The reinforcing member 23 includes a male end 23m and a female end 23f. When two panels 10-10 are placed next to each other in a side-to-side relationship for assembling a structure, the male end 23m of one reinforcing member 23 in one panel 10 slidably lodges into the female end 23f of the
10 other panel 10, as best shown in Fig. 37. The reinforcing member 23 lodges in a transverse polymeric opening 25, which is formed similarly as transverse polymeric opening 17 is formed. The reinforcing member 23 preferably extends from a tongue (identified as "24" below) on one end of the panel member 10 to a channel (identified as "26" below) on the other
15 end of the panel member 10. Thus, the male end 23m of the reinforcing member 23 would protrude from a tongue while the female end 23f of the reinforcing member 23 would communicate with a channel. Transverse polymeric opening 25 is formed with at least one seared or cartherized wall 32 to facilitate the sliding of the reinforcing member 23 thereinto.

20 Each of the brace members 14 has an opening 18 that has a circumference (or perimeter) which is larger than the circumference (or perimeter) of the conduit 16 and larger than
25 the circumference (or perimeter) of the polymeric opening 17 such that after any and all openings 18 have been aligned with any and all polymeric openings 17, the conduit 16 may pass through a respective polymeric opening 17 and through a respective polymeric opening 18 in the brace members 14,
30 preferably without contacting any of the circumferential perimeter of the opening 18 and be supported in a suspended relationship with respect thereto by the polymeric foamed material 12. When ever "perimeter" is stated in the specification and in the claims, it is to be understood to
35 mean any boundary of any opening (e.g. a square opening, a circular opening, etc.) Thus, the term "perimeter" is to include opening, circumference.

For the embodiment of the invention shown in Figs. 36 and 37, each of the brace members 14 would have an additional opening 18 that has a circumference (or perimeter) which is larger than the circumference (or perimeter) of the internal reinforcing member 23 and larger than the circumference (or perimeter) of the polymeric opening 25 such that after any and all additional openings 18 have been aligned with any polymeric opening 25, the internal reinforcing member 23 may lodge in the polymeric opening 25 and pass through the additional opening 18 in the brace members 14, preferably without contacting any of the circumferential perimeter of the additional opening 18 such as to be supported in a suspended relationship with respect thereto by the polymeric foamed material 12.

Each of the panel members 10 also preferably includes ends 20 and 22 (each a defined edge). End 20 is formed with a tongue 24 and the end 22 is formed with a channel 26. Formation of the tongue 24 and/or the channel 26 is preferably accomplished by cutting (preferably hot wire cutting) a portion 36 (see Fig. 8) of polymeric foamed material 12 off of the end 20 and/or end 22 respectively. As best shown in Fig. 13, a pair of panel members 10-10 may be interengaged by sliding the tongue 24 of end 20 into the channel 26 of end 22 to form a structure. As further best shown in Fig. 13, each of the panel members 10 includes the brace member 14 having the opening 18 with the conduit 16 passing through and between the two interengaged panel members 10-10 such that the polymeric foamed material 12 of each of the panel members 10 supports the conduit 16 in a space relationship with respect to the perimeter (i. e. circumference) of each of the openings 18. In other words, the conduit 16 is preferably not to contact any part of the brace member 14.

The polymeric foamed material 12 of the present invention may be any suitable material that is capable of producing the panel 10 of the present invention, preferably a suitable material that is capable of being cut and/or burned and/or melted (i.e. hot wire cut or melted) to produce the panel 10 of the present invention. The polymeric foamed material 12

SECRET - E454450

may be either high density and/or low density polymeric material. The polymeric foamed material 12 provides significant insulating qualities and thereby reduces heat and cooling costs as compared with conventional fiberglass batt insulation of equal thickness. Furthermore, the polymeric foamed material 12 in combination with the plurality of brace members 14 may be customized to provide complete design flexibility and superior structural advantages in shear strength and lateral load capability. The polymeric foamed material 12 exhibits a high strength to weight ratio and also exhibits superior insulating properties. The polymeric foamed material panel 10 provides both a structure and a substrate for the interior and exterior finishes.

Suitable polymeric foamed materials 12 have been discovered to be heat expandable plastic materials, such as pelletized polystyrene and the like. Other suitable heat expandable plastic materials that are within the spirit and scope of the present invention for the polymeric foamed material 12 is polyethylene, polyurethane, polypropylene, polyvinylchloride, etc., all being at a density to provide good thermal insulation and strength. The density is preferably of the order of about 1/2 pound per cubic foot to about 8 pounds per cubic foot. A density of from about 1 pound per cubic foot to about 3 pounds per cubic foot has been found to provide very good thermal properties as well as excellent physical properties including strength.

The heat expandable plastic material also provides for excellent burn-back or melt-back qualities when cut by a laser cutter (not shown) or by a hot wire cutter (identified as "50" below). When the below identified hot wire cutter cuts the heat expandable plastic material, the material typically burns and melts, more specifically melts back, to form the polymeric openings 15, 17 and 25 and slot 30 within the polymeric foamed material 12. Prior to commencing the formation of polymeric openings 15, 17 and 25 and/or slot 30 (i.e. a brace-receiving-configuration or brace-receiving configured slot 30) within the polymeric foamed material 12, the below identified hot wire cutter cuts and/or burns and/or melts back from a surface

74 (i.e. a defined surface 74) a slot 70 (preferably a generally straight thread-like slot 70 with a seared wall 32) down to a point 72 (i.e. a preconfiguration cut point 72) whereafter the below identified hot wire cutter cuts and/or
 5 burns and/or melts back the heat expandable plastic material to produce the polymeric openings 15, 17 and 25 and/or slots 30. The polymeric opening 17 is more technically produced after a residual core 12A (see Fig. 11) is removed in any suitable manner or by any suitable means. The polymeric
 10 openings 15 and 25 are similarly produced, with the residual cores for polymeric openings 15 and 25 not being shown.

Certain epoxy resinous materials have also been discovered to be suitable polymeric foamed material 12. Other
 15 suitable polymeric foamed material(s) 12 for the present invention include a rigid polystyrene, polyurethane, or polyisocyanurate foam or styrofoam. The polymeric foamed material 12 of the present invention provides for prefabricated panels 10 that may be easily installed at a building site for constructing a house, an industrial
 20 building, or any other structure, generally illustrated as 40 in Figs. 2 and 2A.

The most preferred polymeric foamed material 12 from which the panel 10 is to be constructed is expanded polystyrene beads. It is lightweight, quite strong and has
 25 excellent insulating qualities. On an outside wall 42 (see Fig. 6) of the polymeric foamed material panel 10, a sheet of outer skin facing material 46 (such as one or more asbestos cement sheet, plywood, reconstituted timer sheeting, flat steel sheet, profiled steel sheet, rigid plastic sheet or
 30 flexible metal or plastic film or various combinations of outer skins) may be mounted or secured thereto. Examples of other exterior finishes which may be applied include one or more of: EIFS, stucco, metal cladding roofing material, ceramic tiling, wood, vinyl or other treatment customarily
 35 used in building construction. On an inside wall 48 (see Fig. 6 again) of the polymeric foamed material panel 10, a sheet of inner skin facing material 49 (e.g. sheet rock or the like) may be mounted or secured thereto. The sheet of inner skin

SECRET 4450

facing material 49 may be any one or more suitable material(s) customarily employed in finishing the inside walls, roofs, etc., in building construction.

A hot wire cutter assembly, generally illustrated as 50 (see Fig. 7), is preferably provided for cutting and searing purposes. The hot wire cutter assembly 50 is electrically engaged to a computer 52 via one or more conductors 54. The hot wire cutter assembly 50 is typically mounted on a table assembly 56 whereupon polymeric foamed material 12 is placed to be hot wire cut. The hot wire cutter assembly 50 includes at least one wire 58 for receiving current to be heated and to be moved for cutting and searing proposes in accordance with commands from the computer 52, or from manual commands.

The hot wire cutter assembly 50 may be any suitable hot wire cutter assembly that is capable of cutting the desired slots (e.g. generally C-shaped or Z-shaped slots 30 and generally vertical or straight thread-like slots 70, etc.) and openings (e.g. polymeric openings 17, etc.) in the polymeric foamed material 12. A suitable hot wire cutter assembly 50 is commercially available from Starr Mfg., Inc., a division of Starr Foam, Inc. of Fort Worth, Texas. The computer 52 to operate the hot wire cutter assembly 50 may also be obtained from Starr Mfg., Inc. The wire(s) 58 of the hot wire cutter assembly 50 preferably has a diameter ranging from about .03 inch to about .07 inch, more preferably from about .04 inch to about .06 inch. The wire(s) 58 typically receives less than approximately ten (10) amps at a difference of potential of about 110 volts. At a difference in potential of about 220 volts the wire(s) 58 would receive less than about five (5) amps. It is to be understood that the wire 58 may have any suitable diameter, and operate at any suitable voltage or amperage, for practicing the present invention.

Referring in detail now to Figs. 15-18, there is seen another embodiment for the hot wire cutter assembly 50 as comprising a plurality of wires 58 for cutting through a block, generally illustrated as 8, of polymeric foamed material 12. The hot wire cutter assembly 50 is available commercially from HP Machine, 1600 West Acoma Blvd., Lake

Havasu, Arizona 86403, under product model number: Model S-TEL-9000 CNC. The hot wire cutter assembly 50 includes a table assembly, generally illustrated as 120, upon which the block 8 of polymeric foamed material 12 lies while movement of the plurality of wires 58 during the cutting procedure are controlled by a computer control assembly 200 (see Fig. 18). The wires 58 of the hot wire cutter assembly 50 for the embodiment of the invention shown in Figs. 15-18 preferably have a diameter ranging from about .03 inch to about .07 inch, more preferably from about .04 inch to about .06 inch. The wires 58 typically receive less than approximately ten (10) amps at a difference of potential of about 110 volts. At a difference in potential of about 220 volts the wires 58 would receive less than about five (5) amps. It is to be understood that the wires 58 may have any suitable diameter, and operate at any suitable voltage or amperage, for practicing the present invention.

The table assembly 120 includes a table 124 having a pair of generally identical horizontal track assemblies 128-128 connected thereto. A horizontal trolley assembly 130 is slidably mounted to each of the horizontal track assemblies 128. Only one of the horizontal trolley assemblies 130 is shown in Fig. 16, with the other horizontal trolley assembly 130 (not shown) being broadly referenced by a broken-line arrow from 130. The table assembly 120 also includes a support harp 134 having a horizontal support section 136 and a pair of opposed vertical support sections 138-138 integrally bound to the horizontal support section 136. As best shown in Fig. 17, the respective vertical support sections 138 are supported respectively by one of the horizontal trolley assemblies 130 such that when both of the horizontal trolley assemblies 130-130 move in a certain horizontal direction, the support harp 134 also moves in the same horizontal direction. Each of the vertical support sections 138 slidably supports a vertical trolley assembly 150 to which the plurality of wires 58 couple such that when the vertical trolley assemblies 150-150 are moved by the computer control assembly 200 in a certain vertical direction, the plurality of wires 58 move

SECRET - E752450

accordingly in the same vertical direction. Thus, computer control assembly 200 for the present invention, may move the wires 58 either horizontally or vertically, or both horizontally and vertically simultaneously to form any desired shape for the slots 30 or form the cylindrical shaped polymeric openings 15, 17 and 25.

The horizontal track assemblies 128 each include a main table frame 154 having a horizontal trolley track 156 as best shown in Fig. 17. As further best shown in Fig. 17, the horizontal trolley assembly 130 comprises a horizontal trolley 160 slidably mounted along the horizontal trolley track 158, a horizontal locking assembly 164 for locking the horizontal trolley 160, and a drive brace 168 bound to the horizontal trolley 160 and coupled to a horizontal drive cable 170 such that when the horizontal drive cable 170 is moved in a certain horizontal direction by hand or by a motor (identified as "M_H" below), the drive brace 168 also moves, causing the horizontal trolley 160 to also move, in the same certain horizontal direction. The horizontal drive cable 170 is also similarly engaged and coupled to the other horizontal trolley assembly 130 (not shown) through a series of pulleys (not shown) underneath the table 124 such that both horizontal trolley assemblies 130-130 are capable of being moved in unison and in the same horizontal direction by a motor (identified as "M_H" below). As was previously indicated, when the horizontal trolley assemblies 130-130 are moved in a certain horizontal direction, the support harp 134 (and the wires 58) also moves in the same certain horizontal direction.

Each of the vertical trolley assemblies 150 include a sleeve 174 movably engaged to one of the vertical support sections 138 of the support harp 138, as best shown in Figs. 16 and 17. Each of the vertical trolley assemblies 150 have a manual actuation knob 176, a vertical locking mechanism 178, and a vertical drive cable 180 coupled to the sleeve 174. The plurality of wires 58 are coupled to the sleeve 174 such as to move vertically therewith. When the vertical drive cable 180 is moved in a certain vertical direction by a motor (identified as "M_V" below), the sleeve 174 (along with the

plurality of wires 58 coupled thereto) also moves in the same certain vertical direction. The vertical drive cable 180 is also similarly engaged and coupled to the sleeve 174 of the other vertical trolley assembly 150 through a series of pulleys (not shown) such that both vertical trolley assemblies 150-150 are capable of being moved in unison and in the same vertical direction by hand or by a motor (identified as "M_v" below). As previously mentioned, when the vertical trolley assemblies 150-150 are moved in a certain vertical direction along the vertical support section 138 of the support harp 134, the wires 58 also move in the same certain vertical direction. As best shown in Fig. 17, an electrical conductor 186 is coupled to the wires 58 and communicates with a power source for conducting electrical power from the power source to the wires 58 for heating the same.

Referring now to Fig. 18 for the computer assembly 200 of the present invention, there is seen the computer 52 electrically engaged to a CNC controller 210 via at least one conductor 214. CNC controller 210 is electrically engaged to motor M_v, to motor M_h and to power box 220 via conductor 222, conductor 224, and conductor 228 respectively. Power box 220 communicates with a power source through at least one conductor 230 for receiving electrical power and administering the same to the CNC controller 210 through conductor 228.

Through a program in the computer 52, appropriate signals are sent to the CNC controller 210 which in turn releases and/or allocates electrical power to the two motors M_v and M_h based on the signals received from the computer 52. As was previously indicated, the motors M_v and M_h respectively control the vertical and horizontal movement of the wires 58 by moving the vertical trolley assemblies 150 and the horizontal trolley assemblies 130 respectively. The computer control assembly 200 is available commercially from HP Machine, 1600 West Acoma Blvd., Lake Havasu, Arizona 86403.

Continuing to refer to the drawings for operation of the invention and the method for producing the panel 10, the polymeric foamed material 12 is placed upon the table assembly 56 and under (i.e. laterally adjacent to) the wire 58 of the

hot wire cutter assembly 50. While operation of the invention is being initially illustrated with respect to a wire cutter assembly 50 having a single wire 58, a wire cutter assembly 50 having a plurality of wires 58 would operate similarly.

5 Commands are entered into the computer 52 and the wire 58 is heated to a desired temperature (e.g. from about 230°F to about 580°F, preferably from about 250°F to about 350°F) and the now hot wire 58 is lowered against the surface 74 and commences to cut and/or burn and/or melt back the polymeric
10 foamed material 12 to produce the generally straight thread-like vertical slot 70. The slot 70 is continually formed or produced until the hot wire 58 reaches point 72 (see Fig. 9) whereupon the computer 52 sends another signal to the hot wire cutter assembly 50, causing the hot wire 58 to be
15 moved in an essentially generally C-shaped path (as represented by dotted lines in Fig. 9) to produce an essentially generally C-shaped slot 30. One or more of these slot(s) 30 may be formed in the polymeric foamed material 12. As best shown in Fig. 9, two slot(s) 30 were produced in the
20 polymeric foamed material 12.

After the hot wire 58 has cut the slot(s) 30 and 70, the cutting path(s) is reversed by commands from the computer 52 such that the hot wire 58 reversely retraces its initial cutting path(s), which reverse retracing typically causes more
25 burning and/or melt back of polymeric foamed material 12 contiguous to the slot(s) 30 and 70. In reverse retracing of its initial cutting path, the hot wire 58 is "cleaning out" the slot(s) 30 and slot(s) 70 that terminate in slot(s) 30 for further defining the slot(s) 30 and 70, especially slot 30
30 which is of an opening between opposed perimetrical boundaries approximating the thickness of the brace member 14 for snugly receiving the brace member 14 to essentially fully encapsulate the same. Preferably, slot(s) 30 have openings that are greater than the opening of slot(s) 70 that terminate in
35 slot(s) 30. In reverse retracing of its initial cutting path(s), the hot wire 58 further sears and/or cartherizes the seared wall(s) 32 of the slot(s) 70 and 30 to further harden and smooth the same. After the hot wire 58 has reversely

SECRET - 44-50

retraced its initial cutting path(s), the hot wire 58 exits out of slot 70 that terminates in slot 30 and is subsequently elevated above the surface 74.

After forming the desired number of slot(s) 30, the polymeric foamed material 12 is subsequently preferably rotated on top of the table assembly 56 in order to posture the polymeric foamed material 12 for formation of the polymeric opening(s) 17. This obviously is an optional step since there are times that the polymeric foamed material panel 10 is to be produced without any polymeric opening(s) 17. The amount of rotation of the polymeric foamed material 12 for forming polymeric opening(s) 17 would be any suitable amount to accomplish the desired cutting results. Preferably, for a square or rectangular shaped polymeric foamed material 12 as shown in Figs. 9 and 10, the rotation would be approximately 90° such that the polymeric opening 17 to be formed would be generally normal to the slot(s) 30.

In forming the polymeric opening 17, the hot wire 58 is lowered by the hot wire cutter assembly 50 against the surface 74 and another slot 70 is commenced to be cut by the hot wire 58. The slot 70 is continually cut until a point 72 (i.e. a preconfiguration cut point 72) is again reached whereupon the computer signals the hot wire cutter assembly 50 to move the hot wire 58 in a circular fashion or manner to cut and/or burn and/or melt back polymeric foamed material 12 such that when the core material 12A is removed, the polymeric opening 17 is produced with slot 70 terminating in polymeric opening 17. As previously indicated, removal of the core material 12A may be by any suitable means including manual removal of it.

As was seen in the production of slot(s) 30 and 70, after the hot wire 58 has cut polymeric opening 17 (i.e. cylindrical polymeric opening 17) and slot(s) 70 that terminate in polymeric opening(s) 17, the cutting path(s) (e.g. a cylindrical cutting path) is reversed by commands from the computer 52 such that the hot wire 58 reversely retraces its initial cutting path(s) in the formation of polymeric opening 17. Such reverse retracing causes more burning and/or melt back of polymeric foamed material 12 contiguously or

6600T-ETH-460

juxtaposedly exposed on the initially seared wall(s) 32 of the polymeric opening 17 and the slot(s) 70. In reverse retracing of its initial cutting path(s), the hot wire 58 is also further searing and/or cartherizing the wall (i.e. the cylindrical wall) around the core material 12A to further smooth and harden the same to facilitate the removal of the core material 12A. As was previously indicated for the formation of slot(s) 30, by reversely retracing its initial cutting path(s), the hot wire 58 is "cleaning out" the polymeric opening(s) 17 and slot(s) 70 terminating in polymeric opening(s) 17 for further defining polymeric opening(s) 17 and slot(s) 70, especially the polymeric opening(s) 17 which for cylindrical polymeric opening(s) 17 have a diameter that approximates the diameter of conduit 16 for snugly receiving conduit 16 to essentially fully encapsulate the same. Also by reverse retracing of its initial cutting path(s), the hot wire 58 further sears and/or cartherizes the seared wall(s) 32 of polymeric opening(s) 17 and the slot(s) 70 terminating in the polymeric opening (s) 17 to further harden and smooth the same. After the hot wire 58 has reversely retraced its initial cutting path(s) in the formation of polymeric opening(s) 17, the hot wire 58 exits out of the slot 70 terminating in the polymeric opening 17 and is then elevated above the surface 74.

After the core material 12A has been removed from polymeric opening 17, the brace member 14 (see Fig. 10) is aligned with the general C-shaped slot 30 (see Fig. 10) and is subsequently pushed into the cut slot 30 such that the brace member 14 would preferably extend from one extremity of the polymeric foamed material 12 to another extremity of the polymeric foamed material 12. In order words, it is preferred that the brace member 14 extends entirely through the polymeric foamed material 12 such that ends of the brace member 14 are exposed at opposed ends of the polymeric foamed material 12. This enables a more optimal load-bearing function for the brace members 14. Each brace member 14 is preferably inserted into each slot 30.

The brace members 14 may be typically provided with the
 opening (s) 18 which is capable of being aligned with the
 polymeric opening(s) 17 when and after the brace member(s) 14
 are slid into the slot(s) 30 (i.e. preferably generally
 5 C-shaped slot(s) 30) in the polymeric foamed material 12.
 After such alignment, one or more panels 10 may be sent to a
 construction site such that two or more of the panel(s) 10 may
 be combined in any desired manner (e.g. contiguous as shown in
 Figs. 4 and 5 or aligned as shown in Fig. 13) to produce a
 10 structure 40. When postured in an alignment in accordance
 with Fig. 13, the conduit 16 may be slid through the polymeric
 opening(s) 17 and through the opening(s) 18 (see Fig. 1) in
 the brace member(s) 14, preferably such that the conduit 16 is
 supported by the polymeric foamed material 12 in the two or
 15 more panels 10 and preferably such that the conduit 16 does
 not contact any perimeter of the opening(s) 18 in the brace
 member(s) 14.

The tongue 24 and the channel 26 may be cut in the
 opposed ends 20 and 22 of the polymeric foamed material 12 at
 any desired time. More specifically, the tongue 24 and the
 20 channel 26 may be cut after the generally C-shaped slot(s) 30
 and polymeric opening(s) 17 have been cut in the polymeric
 foamed material 12, or the tongue 24 and the channel 26 may be
 cut before the generally C-shaped slot(s) 30 and polymeric
 25 opening(s) have been cut in the polymeric foamed material 12.
 After the tongue 24 and the channel 26 have been formed, any
 wall(s) that the hot wire 58 has contacted is or becomes
 seared wall(s) 32. Thus, the wall(s) of the channel 26 and
 the tongue 24 are seared wall(s) 32.

Continuing to refer to the drawings for operation of
 another preferred embodiment of the present invention
 including the method(s) for producing the panel 10, the block
 8 of the polymeric foamed material 12 is placed upon the table
 124 of the table assembly 120 and next (i.e. laterally
 30 adjacent) to the wires 58 of the hot wire cutter assembly 50.
 The wires 58 are positioned along a side 8s (see Figs. 15 and
 16) of the block 8 of the polymeric foamed material 8. The
 wires 58 are heated to a desired temperature (e.g. from about

230°F to about 580°F). The computer control assembly 200 may be programmed to cause the motors M_x and M_y to move the wires 58 in any desired direction for any desired distance such that a plurality of panels 10 may be produced from the block 8 of polymeric foamed material 12. Preferably, the wires 58 are caused to be initially moved by the computer control assembly 200 to cut a plurality of tongues 24 in the side 8s of the block 8 of polymeric foamed material 8. After the tongues 24 have been formed (see Figs. 15 and 16), the wires 58 are caused to be moved by the computer control assembly 200 to subsequently cut a plurality of slots 30 in the block 8 of polymeric foamed material 12 and to sever the block 8 into a plurality of polymeric foamed materials 12 (i.e. a plurality of polymeric foamed material structures 12s shown in Fig. 19), with each polymeric foamed material structure 12s having a plurality of slots 30, and preferably, at least one polymeric foamed material opening 15.

The slots 30 may be of any desired shape or configuration to receive a comparable shaped or configured stud or brace 14. Preferably, the slots are generally C-shaped, as shown in Fig. 19 and Fig. 32. Alternatively and preferably further, the slots 30 may be partially Z-shaped (see Fig. 29) to partially receive a Z-shaped brace 14 such that when a Z-shaped brace 14 is slid into the partially Z-shaped slot 30, a portion of Z-shaped brace 14 protrudes away from the polymeric foamed material 12, as best shown in Fig. 30. The slots 30 may be partially C-shaped (see Fig. 26) to partially receive a C-shaped brace 14 such that when a C-shaped brace 14 is slid into the partially C-shaped slot 30, a portion of the C-shaped brace 14 protrudes away from the polymeric foamed material 12, as best shown in Figs. 27 and 28B. The polymeric openings 15 are preferably cylindrical openings for receiving the conduits 19.

After the slots 30 and polymeric openings 15 have been cut and the plurality of polymeric foamed material structures 12s have been produced (see Fig. 19) from the block 8 of polymeric foamed material 12, the computer control assembly 200 preferably causes the wires 58 to be moved to cut a

plurality of channels 26 in the side of the block 8 of the polymeric foamed material 12 opposed to the side 8s.

Subsequently, the plurality of polymeric foamed material structures 12s, while remaining in a stacked or superimposed relationship, are rotated 90 degrees to posture the stacked polymeric foamed material structures 12s for formation of the track chases 100 and the transverse polymeric opening(s) 17 and 25 if desired. The wires 58 are moved by computer control assembly 200 such that the track chases 100 are formed in each of the polymeric foamed material structures 12s at any desired location, preferably at the location shown in Figs. 25-31. The transverse polymeric openings 17 may be formed in the respective polymeric foamed material structures 12s by passing each wire 58 in an initially cut path between any two superimposed polymeric foamed material structures 12s-12s and either raising or lowering the wire 58 against the respective surface 74 (e.g. see Fig. 10) of a respective polymeric foamed material structure 12s and respective slots 70 are commenced to be cut by each of the hot wires 58. The respective slots 70s are continually cut until respective points 72 (i.e. preconfiguration cut points 72) are reached whereupon the computer 52 signals the hot wire cutter assembly 50 to move the hot wires 58 in a circular fashion or manner to cut and/or burn and/or melt back polymeric foamed material 12 such that when respective core materials 12A are removed, the polymeric opening 17 is produced in each of the polymeric foamed material structures 12s with a respective slot 70 terminating in a respective polymeric opening 17. As previously indicated, removal of the core material 12A may be by any suitable means including manual removal of it. Polymeric openings 25 may be formed in the same manner after a core material (not shown, but similar to core material 12A) has been removed. As was previously indicated, conduits 16 and internal reinforcing member 23 are to be respectively inserted into the polymeric openings 17 and into the polymeric openings 25.

Referring now to Figs. 19-25 for the procedure of cutting generally C-shaped slots 30 as shown in the respective

polymeric foamed material structures 12s, the plurality of hot wires 58 are moved by the computer control assembly 200 in direction of the arrow 300 (see Fig. 20) for a desired distance. The wires 58 are then moved in direction of the arrow 302 (which is preferably normal to the direction of the arrow 300) for a distance which approximates the length of a flange return 14r of a generally C-shaped brace member 14. Wires 58 are subsequently moved a predetermined distance L (see Fig. 24) in direction of the arrow 304 into an off-set position. The distance L is preferably equal to about the measurement of the diameter D (see Fig. 23) of one of the wires 58. The direction of the arrow 304 is preferably a direction which is generally perpendicular to direction of arrow 302. From the off-set position the wires 58 move in direction of the arrow 306 for a distance which is less than distance that the wires 58 moved when travelling in direction of the arrow 302. When the wires 58 are travelling in direction of the arrow 306, they are forming an off-set path next to the path that the wires 58 formed in travelling the direction of arrow 302. The width W of the off-set path is approximately equal to twice the measurement of the diameter D of the wires 58 (see Fig. 24).

After travelling a distance in direction of the arrow 306 which is less than the distance that the wires travelled in direction of the arrow 302, the wires 58 travel in direction of the arrow 308 (see Fig. 20 again). The direction of the arrow 308 is generally normal to the direction of the arrow 306. After travelling a desired distance along a path in direction of the arrow 308, the wires are then moved by the computer control assembly 200 in direction of the arrow 310. It should be understood that the distance that the wires 58 travelled in direction of the arrow 308 is approximately equal to the length of a flange 14f of a generally C-shaped brace member 14. The distance that the wires 58 travelled in direction of the arrows 308 is also approximately equal to the width of a polymeric material crest 12c (see Fig. 20B), with the height of the polymeric material crest 12c resulting from the wires 58 travelling at a distance in direction of the

arrow 306 that is less than the distance that the arrows travelled in direction of the arrows 302. Polymeric material crest 12c also results from a polymeric material recess 12r being formed (see Fig. 20B again).

5 The wires 58 travel a distance in direction of the arrow 310, which distance is approximately equal to the length of a web 14f of a generally C-shaped brace member 14. From the direction of the arrow 310, the wires 58 travel in direction of the arrow 312 for a distance that approximately equals the
10 distance that the wires 58 travelled in direction of the arrow 308. The direction of the arrow 312 is generally perpendicular to the direction of the arrow 310. The wires 58 subsequently travel in direction of the arrow 314 for a distance that approximately equals the distance that the wires
15 58 travelled in direction of the arrow 306. From direction of the arrow 314, the wires 58 are then moved in direction of the arrow 316 for a predetermined distance which is preferably equal to the predetermined distance L (see Fig. 24). The wires 58 are now in another off-set position. From this off-
20 set position, the wires 58 generally retrace the path that the wires 58 cut when moving in direction of the arrows 310, 312 and 314. While retracing this path, the wires 58 remain in the off-set position. In retracing the path that the wires 58 made when moving in direction of the arrows 310, 312 and 314,
25 the wires 58 move in direction of the arrows 318, 320 and 322, as best shown in Fig. 20. The distance that the wires 58 travel in direction of the arrow 318 is generally equal to the distance that the wires 58 travelled when travelling in the direction of the arrow 302. The direction of the arrow 320 is
30 generally normal to the direction of arrows 318 and 322. After having moved in direction of the arrows 318, 320 and 322 to form an off-set path next to the path that the wires 58 formed when moving in direction of the arrows 310, 312, and 314, the wires 58 then move in direction of the arrow 324.
35 The generally C-shaped slot 30 of Figs. 19, 20, and 25 has now been formed.

By the practice of the present invention there is provided a method for producing the polymeric foamed material

panel 10 (e.g. a low density synthetic panel) comprising the steps of: (a) providing the polymeric foamed material 12; (b) cutting (e.g. with one or more wires 58) the polymeric foamed material 12 of step (a) until reaching the preconfiguration cut point 72; (c) cutting subsequently from the preconfiguration cut point 72 the brace-receiving configuration (i.e. the slot 30) in the polymeric foamed material 12; and (d) sliding the brace member into the brace-receiving configuration (or the slot 30) to produce the polymeric foamed material panel 10. The cutting in step (b) and the cutting in step (c) comprises cutting the polymeric foamed material 12 of step (a) with the hot wire cutter assembly 50 which is preferably operated by the computer 52. The cutters may also be laser cutters. The brace-receiving configuration in the polymeric foamed material 12 preferably comprises the slot 30 for receiving the brace member 14. The slot 30 includes at least one seared wall 32 for facilitating the sliding of the brace member 14. The brace member 14 includes the opening 18 with an opening perimeter. The method additionally comprises forming the polymeric (foamed material) opening 17 in the polymeric foamed material 12. The polymeric foamed material opening 17 has a polymeric foamed material opening perimeter. The sliding in step (d) comprises sliding the brace member 14 into the brace-receiving configuration until the opening 18 of the brace member 14 is generally aligned with the polymeric (foamed material) opening 17. The opening perimeter of the opening 18 in the brace member 14 has a dimension that is greater than 4 dimension of the polymeric foamed material opening perimeter of the polymeric (foamed material) opening 17 in the polymeric foamed material 12.

By the practice of the present invention there is further provided a method for forming a structure 40 comprising the steps of: (a) providing a first polymeric foamed material 12 having a first defined edge 20 (i.e. end 20); (b) cutting a first brace-receiving-configured slot 30 in the first polymeric foamed material 12; (c) cutting the first defined edge 20 of the first polymeric foamed material 12 to form the tongue 24 on the first defined edge 20; (d) sliding a first

brace member 14 into the first brace-receiving-configured slot 30; (e) providing a second polymeric foamed material 12 having a second defined edge 22 (i.e. end 22); (f) cutting a second brace-receiving-configured slot 30 in the second polymeric foamed material 12; (g) cutting the second defined edge 22 of the second polymeric foamed material 12 to form the channel 26 in the second defined edge 22; (h) sliding the second brace member 14 into the second brace-receiving-configured slot 30; and (i) sliding the tongue 24 on the first defined edge 20 of the first polymeric foamed material 12 into the channel 26 in the second defined edge 22 of the second polymeric foamed material 12 to form the structure 40.

By the further practice of the present invention there is also provided a polymeric foamed material panel 10 comprising a panel 10 consisting of the polymeric foamed material 12; a brace-receiving-configured slot (i.e. slot 30 preferably) disposed in the polymeric foamed material 12 of the panel 10 and a brace member 14 disposed in the brace-receiving-configured slot 30 in the polymeric foamed material 12 of the panel 10. The preferred brace-receiving-configured slot 30 includes at least one seared wall 32; typically all walls of the slot 30 are seared. The polymeric foamed material panel 10 additionally comprises a generally straight thread-like slot 70 extending from a defined surface 74 of the polymeric foamed material 12 to the brace-receiving-configured slot 30; and a second generally straight thread-like slot 70 extending from the defined surface 74 of the polymeric foamed material 12 to a generally cylindrical polymeric opening 17 in the polymeric foamed material 12. All walls of the polymeric opening 17 are typically seared.

Practice of the present invention also provides method for producing a plurality of polymeric foamed material panels 10 comprising the steps of: (a) providing a block 8 of polymeric foamed material 12; (b) cutting the polymeric foamed material 12 with a plurality of cutters (e.g. laser cutters or hot wires 58) until each cutter reaches a respective preconfiguration cut point (i.e. preconfiguration cut point

72); (c) cutting subsequently with each cutter from the respective preconfiguration cut point of each cutter a respective brace-receiving slot 30 in the polymeric foamed material 12; (d) cutting then the polymeric foamed material 12 with the plurality of cutters to produce a plurality of polymeric foamed material structures 12s having a plurality of brace-receiving slots 30; and (e) sliding a plurality of brace members 14 into the brace-receiving slots 30 of the polymeric foamed material structures 12s to produce a plurality of polymeric foamed material panels 10, each of the polymeric foamed material panels 10 having at least one of the brace members 14. This method additionally comprises cutting with each cutter a respective polymeric foamed material opening (e.g. opening 15, 17 or 25) in the polymeric foamed material 12 such that each polymeric foamed material structure 12s has a polymeric foamed material opening (e.g. opening 15, 17 or 25) to define a chase. The cutters are preferably computer operated to provide desired cut accuracy.

Another practice of the present invention provides a method for producing a plurality of polymeric foamed material panels 10 comprising the steps of: (a) providing a block 8 (e.g., a generally stationary block) of polymeric foamed material 12 (e.g., expanded polystyrene (EPS)); (b) cutting the polymeric foamed material 12 with a plurality of cutters (e.g., hot wire cutters, laser cutter, etc.) until each cutter reaches a respective preconfiguration cut point 72; (c) cutting subsequently with each cutter from the respective preconfiguration cut point 72 of each cutter a respective brace-receiving slot 30 in the polymeric foamed material 12; (d) cutting then the polymeric foamed material 12 with said plurality of cutters to produce a plurality of polymeric foamed material structures 12s having a plurality of brace-receiving slots 30, which may be linear or nonlinear slots; and (e) sliding a plurality of brace members 14 into the brace-receiving slots 30 of the polymeric foamed material structures 12s to produce a plurality of polymeric foamed material panels 10, each of the polymeric foamed material panels 10 having at least one of the brace members 14. In the

immediate foregoing method of the present invention, the brace members 14 include sides. More particularly, each of the brace members 14 preferably comprises the web 14w, the flanges 14f-14f integrally bound to the web 14w, and the flange returns 14r-14r integrally bound to the flanges 14f-14f. The web 14w, the flanges 14f-14f, and the flange returns 14r-14r are surrounded by the polymeric foamed material 12.

Alternatively and as another embodiment of the present invention, a portion of at least one brace member 14 protrudes from each of the polymeric foamed material panels 10.

Therefore, the sliding step (e) in the immediate foregoing method more specifically comprises sliding one of the flanges 14f and flange return 14r associated therewith, and a portion of the web 14w of respective brace members 14 into respective brace-receiving slots 30 of the polymeric foamed material structures 12s to produce the plurality of polymeric foamed material panels 10, with each of the polymeric foamed material panels 10 having the other flange 14f and the flange return 14r associated therewith, and a portion of the web 14w of at least one of the brace members 14 disposed outside thereof.

An alternative practice of the present invention provides a method for producing a plurality of polymeric foamed material structures 12s having slots 30 for receiving stud members 14 comprising the steps of: (a) cutting a polymeric foamed material 12 (e.g., a generally stationary block 8 of expanded polystyrene (ESP)) with a plurality of cutters, such as hot wire cutters or laser cutters, in a first direction (e.g. in direction of the arrow 300 in Fig. 20); (b) cutting subsequently in a second direction (e.g. in direction of the arrow 302 or arrow 310 in Fig. 20) the polymeric foamed material 12 with the plurality of cutters until each cutter forms a first respective slot in the polymeric foamed material 12; (c) cutting in the first direction the polymeric foamed material 12 with the plurality of cutters to produce a plurality of polymeric foamed material structures 125 having a plurality of first slots (e.g. slot sections 30r₁ in Fig. 20), which may be linear or nonlinear slots. The immediately foregoing method broadly additionally comprises cutting the

polymeric foamed material 12 with the plurality of cutters until each cutter forms a second respective slot (e.g. slot section 30s in Fig. 20) in the polymeric foamed material 12. The immediate foregoing method more particularly additionally comprises cutting the polymeric foamed material 12 with the plurality of cutters until each cutter forms a respective recess (e.g. polymeric material recess 12r in Fig. 20) in the polymeric foamed material 12; and subsequently cutting the polymeric foamed material 12 with the plurality of cutters until each cutter forms a second respective slot (e.g. slot sections 30s in Fig. 20) in the polymeric foamed material 12 such that after cutting, a plurality of polymeric foamed material structures are produced having a plurality of first slots (e.g. slot sections 30r₁) and a plurality of second slots (e.g. slot sections 30s) and a plurality of recesses (e.g. polymeric material recesses 12r). A plurality of stud members 14 is provided wherein each of the stud members 14 comprises a web 14w, a first flange 14f integrally bound to the web 14w, a first flange return 14r integrally bound to the first flange 14f, a second flange 14f also integrally bound to the web 14w, and a second flange return 14r integrally bound to the second flange 14f. The stud members 14 are slid into the first and second slots and into the recesses of the polymeric foamed material structures 12s, such that after the sliding step, the first flange return 14r and the first flange 14f of each of the stud members 14 occupies respectively one of the first slots (e.g. slot sections 30r₁) and one of the recesses (e.g. polymeric material recess 12r) of the polymeric foamed material structures 12s, and the web 14w, the second flange 14f and the second flange return 14r of each of the stud members 14 occupies one of the second slots (e.g. slot section 30s) of the polymeric foamed material structures 12s. The cutters are preferably computer operated to provide the desired cut accuracy during the cutting steps.

Other features in alternative practices of the present invention include interrupting the movement of a plurality of cutters in a first direction of travel to move the cutters in at least one direction of travel which differs from the first

direction of travel in order to form one or more brace-receiving slots. These features are embodied in a method for producing a plurality of polymeric foamed material structures 12s having brace-receiving slots 30 comprising the steps of:

5 (a) providing a block 8 of polymeric foamed material 12; and
 (b) moving a plurality of cutters through the block 8 of polymeric foamed material in a first direction (e.g. in direction of arrow 300 in Fig. 20) of travel, while interrupting at least one time the moving of the plurality of

10 cutters in the first direction of travel to move the cutters through the block 8 of polymeric foamed material 12 in at least one direction of travel (e.g. in direction of arrow 302 or arrow 310 in Fig. 20) which differs from the first direction of travel, such that each cutter produces a

15 respective brace-receiving slot 30 in the polymeric foamed material 12, until the plurality of cutters have moved completely through the block 8 of polymeric foamed material 12 to produce a plurality of polymeric foamed material structures 12s with each structure 12s having at least one brace-

20 receiving slot (e.g. slot sections 30s and/or 30r₁ in Fig. 20). These features are also embodied in a method for producing a plurality of polymeric foamed material structures 12s having brace-receiving slots comprising the steps of:

25 (a) providing a block 8 of polymeric foamed material 12 in a generally stationary position; (b) moving a plurality of cutters through the generally stationary block 8 of polymeric foamed material 12 in a first direction of travel (e.g. in direction of arrow 300 in Fig. 20); (c) interrupting the movement of the plurality of cutters from the first direction

30 of travel through the generally stationary block 8 of polymeric foamed material 12 to move the cutters in at least one direction of travel (e.g. in direction of the arrow 302 in Fig. 20) which differs from the first direction of travel such that each cutter produces a respective brace-receiving slot

35 (e.g. slot section 30r₁ in Fig. 20) in the polymeric foamed material 12, and (d) continuing the moving of the plurality of cutters in the first direction of travel, while intermittently interrupting the movement of the plurality of cutters from the

SECRET 454460

first direction of travel to move the cutters in at least one direction of travel (e.g. in direction of the arrow 310 in Fig. 20) which differs from the first direction of travel such that each cutter produces at least one additional respective
 5 brace-receiving slot (e.g. slot section 30s in Fig. 20) in the polymeric foamed material 12, until the plurality of cutters have moved completely through the generally stationary block 8 of polymeric foamed material 12 after which a plurality of polymeric foamed material structures 12s are produced with
 10 each polymeric foamed material structure 12s having a plurality of brace-receiving slots (e.g. slot sections 30s and/or 30r₁ in Fig. 20).

In additional practices of the present invention there is broadly provided a method for producing a polymeric foamed
 15 material structure 12s having a slot (e.g. slot section 30r₁ in Fig. 20) comprising the steps of: (a) cutting with a cutter a polymeric foamed material 12 until reaching a preslot cut point (e.g. the point where the hot wire 58 stops after being moved in direction of the arrow 300 in Fig. 20); (b)
 20 cutting subsequently a first path in the polymeric foamed material 12 with the cutter from the preslot cut point until reaching a first cut point (e.g. the point where the hot wire 58 stops after being moved in direction of the arrow 302 in Fig. 20); (c) moving the cutter in the polymeric foamed
 25 material 12 a predetermined distance (e.g. distance L in Fig. 24) from the first cut point to a second cut point (e.g. the point where the hot wire 58 stops after being moved in direction of the arrow 304 in Figs. 20 and 24); and (d) cutting subsequently from the second cut point a second path
 30 (e.g. an off-set path) in the polymeric foamed material 12 with the cutter until the cutter reaches a postslot cut point (e.g. the point where the hot wire 58 stops after being moved in direction of the arrow 306 in Figs. 20 and 24) to produce a polymeric foamed material structure 12s having a slot (e.g.
 35 slot section 30r₁ in Fig. 20). In the immediate foregoing method of the present invention, the cutter is preferably a computer-operated hot wire cutter having a wire diameter D with a generally known diameter measurement, and the slot

(e.g. slot section 30r₁ in Fig. 20) has a width W equal to about twice the generally known diameter measurement of the wire diameter D , and a width W equal to about twice the predetermined distance (e.g. distance L in Fig. 24).

Further additional practices of the present invention broadly provide a method for producing at least one polymeric foamed material structure 12s having at least one slot (e.g. slot section 30s in Fig. 20) comprising the steps of: (a) providing at least one cutter; (b) cutting with the cutter a polymeric foamed material 12 until the cutter reaches at least one respective preslot cut point (e.g. the point where the hot wire 58 stops after being moved in direction of the arrow 308 in Fig. 20); (c) cutting subsequently with cutter from the respective preslot cut point at least one respective path in the polymeric foamed material 12 until the cutter reaches at least one first cut point (e.g. the point where the hot wire 58 stops after being moved in direction of the arrows 310, 312 and 314 in Fig. 20); (d) forming with the cutter in the polymeric foamed material 12 at least one respective off-set path (e.g. the path taken by hot wire 58 in moving in direction of the arrows 318, 320 and 322 in Fig. 20) communicating with the respective path to form at least one slot (e.g. slot section 30s in Fig. 20) within the polymeric foamed material 12; and (e) cutting subsequently the polymeric foamed material 12 with the cutter (e.g. in direction of the arrow 324 in Fig. 20) until the cutter has cut through the polymeric foamed material 12, producing at least one polymeric foamed structure 12s having at least one slot (e.g. slot section 30s in Fig. 20). In the immediate foregoing method, the at least one respective path has at least one respective path length, and the at least one respective off-set path communicates with the at least one respective path along the at least one respective path length of the at least one respective path, such that the at least one respective path and the least one respective off-set path together form the at least one slot (e.g. slot section 30s in Fig. 20) within the polymeric foamed material 12.

Thus, practice of the present invention provides one or more polymeric foamed material panel(s) 10 which may be processed into any suitable blocks, for example, 4 feet by 4 feet by 24 feet. These blocks of polymeric foamed material 12 have been hot wired cut into an associated desired thickness as needed by the laminator/panel manufacturer. The polymeric foamed material panel(s) 10 of the present invention preferably encapsulate metal studs or braces 14 (as well as rafters if desired) in order to eliminate the need for plywood or OSB skins and the adhesives currently required in panel production. The metal studs 14 and rafters supply the structural engineering strength requirements.

The polymeric foamed material panel 10 becomes a pre-engineered "system" for building structures including, but not limited to, homes, apartments and commercial buildings or structures, as represented by structure(s) 40 in Figs. 2 and 2A. The polymeric foamed material panel(s) 10 of the present invention is an improvement over the prior art in that they become the structure, the insulation, and the substrate for the interior and exterior finishes. The polymeric foamed material panel(s) 10 and the method of the present invention are also an improvement over the prior art in that they provide a market ready product at a significantly lower cost by eliminating secondary processing steps. The polymeric foamed material panel(s) 10 may be used in tandem with traditional Stress Skin and Structural Panels when attachment of a specific product (e.g. asphalt shingles, etc.) to the panel(s) 10 requires a solid wood substrate.

While the present invention has been described herein with reference to particular embodiments thereof, a latitude of modification, various changes and substitutions are intended in the foregoing disclosure, and it will be appreciated that in some instances some features of the invention will be employed without a corresponding use of other features without departing from the scope and spirit of the invention as set forth. Therefore, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the

essential scope and spirit of the present invention. It is intended that the invention not be limited to the particular embodiment disclosed as the best mode contemplated for carrying out this invention, but that the invention will include all embodiments and equivalents falling within the scope of the appended claims.

5

SECRET

WHAT IS CLAIMED IS:

1 1. A method for producing a plurality of polymeric
2 foamed material structures having brace-receiving
3 configurations comprising the steps of:

4 (a) providing a block of polymeric foamed
5 material;

6 (b) cutting the polymeric foamed material of
7 step (a) with a plurality of cutters until each cutter
8 reaches a respective preconfiguration cut point;

9 (c) cutting subsequently with each cutter from
10 the respective preconfiguration cut point of each cutter
11 a respective brace-receiving configuration in the
12 polymeric foamed material; and

13 (d) cutting, after said cutting step (c), the
14 polymeric foamed material of step (c) with said plurality
15 of cutters to produce a plurality of polymeric foamed
16 material structures, each of said polymeric foamed
17 material structures having a brace-receiving
18 configuration.

1 2. The method of claim 1 wherein said cutting in
2 step (b), said cutting in step (c), and said cutting in step
3 (d) is with a plurality of laser cutters.

1 3. The method of claim 1 wherein said cutting in
2 step (b), said cutting in step (c), and said cutting in step
3 (d) is with a plurality of hot wire cutters.

1 4. The method of claim 1 wherein said polymeric
2 foamed material is generally stationary.

1 5. The method of claim 2 wherein said polymeric
2 foamed material is generally stationary.

1 6. The method of claim 3 wherein said polymeric
2 foamed material is generally stationary.

1 7. The method of claim 1 additionally comprising
2 cutting with each cutter, prior to said cutting step (d), a
3 respective polymeric foamed material opening in the polymeric
4 foamed material such that each polymeric foamed material
5 structure has a polymeric foamed material opening to define a
6 chase.

1 8. The method of claim 2 additionally comprising
2 cutting with each cutter, prior to said cutting step (d), a
3 respective polymeric foamed material opening in the polymeric
4 foamed material such that each polymeric foamed material
5 structure has a polymeric foamed material opening to define a
6 chase.

1 9. The method of claim 3 additionally comprising
2 cutting with each cutter, prior to said cutting step (d), a
3 respective polymeric foamed material opening in the polymeric
4 foamed material such that each polymeric foamed material
5 structure has a polymeric foamed material opening to define a
6 chase.

1 10. The method of claim 6 additionally comprising
2 cutting with each cutter, prior to said cutting step (d), a
3 respective polymeric foamed material opening in the polymeric
4 foamed material such that each polymeric foamed material
5 structure has a polymeric foamed material opening to define a
6 chase.

1 11. The method of claim 10 wherein said polymeric
2 foamed material comprises expanded polystyrene (EPS).

1 12. The method of claim 1 wherein said brace-
2 receiving configuration in each of said polymeric foamed
3 material structures is a non-linear brace-receiving
4 configuration.

1 13. The method of claim 3 wherein said brace-
2 receiving configuration in each of said polymeric foamed

SECRET 44-38861

material structures is a non-linear brace-receiving configuration.

14. The method of claim 4 wherein said brace-receiving configuration in each of said polymeric foamed material structures is a non-linear brace-receiving configuration.

15. The method of claim 11 wherein said brace-receiving configuration in each of said polymeric foamed material structures is a non-linear brace-receiving configuration.

16. The method of claim 1 additionally comprising computer operating said plurality of cutters.

17. The method of claim 3 additionally comprising computer operating said plurality of hot wire cutters.

18. The method of claim 6 additionally comprising computer operating said plurality of hot wire cutters.

19. A method for producing a plurality of polymeric foamed material panels comprising the steps of:

(a) providing a block of polymeric foamed material;

(b) cutting the polymeric foamed material of step (a) with a plurality of cutters until each cutter reaches a respective preconfiguration cut point;

(c) cutting subsequently with each cutter from the respective preconfiguration cut point of each cutter a respective brace-receiving slot in the polymeric foamed material;

(d) cutting, after said cutting step (c), the polymeric foamed material of step (c) with said plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of brace-receiving slots; and

(e) sliding a plurality of brace members into the brace-receiving slots of the polymeric foamed material structures of step (d) to produce a plurality of polymeric foamed material panels, each of said polymeric foamed material panels having at least one of said brace members.

20. The method of claim 19 wherein a portion of said at least one of said brace members protrudes from each of said polymeric foamed material panels.

21. The method of claim 19 wherein each of said brace members includes brace sides, and said brace sides of each of said brace members are surrounded by polymeric foamed material.

22. The method of claim 19 wherein said plurality cutters are hot wire cutters.

23. The method of claim 19 wherein said plurality cutters are laser cutters.

24. The method of claim 19 wherein said polymeric foamed material is generally stationary.

25. The method of claim 22 wherein said polymeric foamed material is generally stationary.

26. The method of claim 19 wherein said brace-receiving slots in said polymeric foamed material panels are non-linear brace-receiving slots.

27. The method of claim 22 wherein said brace-receiving slots in said polymeric foamed material panels are non-linear brace-receiving slots.

1 28. The method of claim 25 wherein said brace-
2 receiving slots in said polymeric foamed material panels are
3 non-linear brace-receiving slots.

1 29. The method of claim 19 additionally comprising
2 computer operating said plurality of cutters.

1 30. The method of claim 22 additionally comprising
2 computer operating said hot wire cutters.

1 31. The method of claim 28 additionally comprising
2 computer operating said hot wire cutters.

1 32. The method of claim 19 wherein each of said
2 brace members comprises a web, a first flange integrally bound
3 to said web, and a second flange integrally bound to said web.

1 33. The method of claim 32 wherein said sliding
2 step (e) further comprises sliding said first flange and a
3 portion of said web of respective brace members into
4 respective brace-receiving slots of said polymeric foamed
5 material structures to produce said plurality of polymeric
6 foamed material panels, each of said polymeric foamed material
7 panels having said second flange and a portion of said web of
8 at least one of said brace members disposed outside thereof.

1 34. The method of claim 32 wherein each of said
2 brace members comprises a web, a first flange integrally bound
3 to said web, a first flange return integrally bound to said
4 first flange, a second flange integrally bound to said web,
5 and a second flange return integrally bound to said second
6 flange.

1 35. The method of claim 34 wherein said sliding
2 step (e) further comprises sliding said first flange and said
3 first flange return and a portion of said web of respective
4 brace members into respective brace-receiving slots of said
5 polymeric foamed material structures to produce said plurality

of polymeric foamed material panels, each of said polymeric foamed material panels having said second flange and said second flange return and a portion of said web of at least one of said brace members disposed outside thereof.

36. A method for producing a plurality of polymeric foamed material structures having slots for receiving stud members comprising the steps of:

(a) cutting a polymeric foamed material with a plurality of cutters in a first direction;

(b) cutting subsequently in a second direction the polymeric foamed material of step (a) with the plurality of cutters until each cutter forms a first respective slot in the polymeric foamed material;

(c) cutting, after said cutting step (b), in said first direction the polymeric foamed material of step (b) with the plurality of cutters to produce a plurality of polymeric foamed material structures having a plurality of first slots.

37. The method of claim 36 additionally comprising cutting, prior to said cutting step (c), the polymeric foamed material of step (b) with the plurality of cutters until each cutter forms a second respective slot in the polymeric foamed material.

38. The method of claim 36 additionally comprising cutting, prior to said cutting step (c), the polymeric foamed material of step (b) with the plurality of cutters until each cutter forms a respective recess in the polymeric foamed material; and subsequently cutting, prior to said cutting step (c), the polymeric foamed material with the plurality of cutters until each cutter forms a second respective slot in the polymeric foamed material such that after said cutting step (c), a plurality of polymeric foamed material structures are produced having a plurality of first slots and a plurality of second slots and a plurality of recesses.

1 39. The method of claim 38 additionally comprising
2 providing a plurality of stud members wherein each of said
3 stud members comprises a web, a first flange integrally bound
4 to said web, a first flange return integrally bound to said
5 first flange, a second flange integrally bound to said web,
6 and a second flange return integrally bound to said second
7 flange.

1 40. The method of claim 39 additionally comprising
2 sliding said stud members into said first and second slots and
3 into said recesses of said polymeric foamed material
4 structures.

1 41. The method of claim 40 wherein after said
2 sliding step, said first flange return and said first flange
3 of each of said stud members occupies respectively one of said
4 first slots and one of said recesses of said polymeric foamed
5 material structures.

1 42. The method of claim 41 wherein said web, said
2 second flange and said second flange return of each of said
3 stud members occupies one of said second slots of said
4 polymeric foamed material structures.

1 43. The method of claim 36 wherein said plurality
2 of cutters are hot wire cutters.

1 44. The method of claim 36 wherein said cutters are
2 laser cutters.

1 45. The method of claim 38 wherein said second
2 slots are non-linear slots.

1 46. The method of claim 36 wherein said polymeric
2 foamed material is generally stationary.

1 47. The method of claim 36 additionally comprising
2 computer operating said plurality of cutters.

36 a respective seventh distance in the polymeric foamed
37 material of step (f);

38 (h) cutting subsequently with the plurality of
39 cutters in said third direction the polymeric foamed
40 material of step (g) until each of said cutters has moved
41 a respective eighth distance in the polymeric foamed
42 material of step (g);

43 (i) cutting subsequently with the plurality of
44 cutters in said fourth direction the polymeric foamed
45 material of step (h) until each of said cutters has moved
46 a respective ninth distance in the polymeric foamed
47 material of step (h);

48 (j) cutting subsequently with the plurality of
49 cutters in said second direction the polymeric foamed
50 material of step (i) until each of said cutters has moved
51 a respective tenth distance in the polymeric foamed
52 material of step (i);

53 (k) cutting subsequently with the plurality of
54 cutters in said first direction the polymeric foamed
55 material of step (j) until each of said cutters has moved
56 a respective eleventh distance in the polymeric foamed
57 material of step (j);

58 (l) cutting subsequently with the plurality of
59 cutters in said third direction the polymeric foamed
60 material of step (k) until each of said cutters has moved
61 a respective twelfth distance in the polymeric foamed
62 material of step (k); and

63 (m) cutting, after said cutting step (l), in
64 said first direction the polymeric foamed material of
65 step (l) with the plurality of cutters to produce a
66 plurality of polymeric foamed material structures having
67 a plurality of slots.

1 50. The method of claim 49 wherein said respective
2 third distance and said respective eighth distance are
3 approximately equal.

51. The method of claim 49 wherein said respective fifth distance and said respective seventh distance are approximately equal.

52. The method of claim 49 wherein said respective fourth distance is generally less than said respective second distance.

53. The method of claim 49 wherein said respective eighth distance is generally less than said respective tenth distance.

54. The method of claim 49 wherein said third direction is generally opposite to said second direction.

55. The method of claim 49 wherein said fourth direction is generally opposite to said first direction.

56. The method of claim 50 wherein said plurality of cutters are hot wire cutters, each of said hot wire cutters include a wire diameter with a generally known diameter measurement which generally equals said respective third distance and said respective eighth distance.

57. The method of claim 56 additionally comprising computer operating said plurality of hot wire cutters.

58. The method of claim 49 wherein said plurality of cutters generally move in unison.

59. The method of claim 57 wherein said plurality of hot wire cutters generally move in unison.

60. A method for producing a plurality of polymeric foamed material structures comprising the steps of:

(a) cutting a polymeric foamed material with a plurality of cutters until each cutter reaches a respective first cut point;

6
7
8
9

10
11
12
13

14
15
16
17
18

19
20
21
22
23

- 1
- 2
- 3
- 4
- 5

- 1
- 2

- 1
- 2

$$\begin{matrix} 1 \\ 2 \end{matrix}$$

- 1
- 2

1 66. The method of claim 60 wherein said plurality
2 of cutters is a plurality of laser cutters.

1 67. A method for producing a plurality of polymeric
2 foamed material structures having brace-receiving slots
3 comprising the steps of:

4 (a) providing a block of polymeric foamed
5 material; and

6 (b) moving a plurality of cutters through the
7 block of polymeric foamed material in a first direction
8 of travel, while interrupting at least one time the
9 moving of the plurality of cutters in said first
10 direction of travel to move the cutters through the block
11 of polymeric foamed material in at least one direction of
12 travel which differs from said first direction of travel,
13 such that each cutter produces a respective brace-
14 receiving slot in the polymeric foamed material, until
15 said plurality of cutters have moved completely through
16 the block of polymeric foamed material to produce a
17 plurality of polymeric foamed material structures with
18 each structure having at least one brace-receiving slot.

1 68. A method for producing a plurality of polymeric
2 foamed material structures having brace-receiving slots
3 comprising the steps of:

4 (a) providing a block of polymeric foamed
5 material in a generally stationary position;

6 (b) moving a plurality of cutters through the
7 generally stationary block of polymeric foamed material
8 of step (a) in a first direction of travel;

9 (c) interrupting the movement of the plurality
10 of cutters from said first direction of travel through
11 the generally stationary blocks of polymeric foamed
12 material to move the cutters in at least one direction of
13 travel which differs from said first direction of travel
14 such that each cutter produces a respective brace-
15 receiving slot in the polymeric foamed material; and

16 (d) continuing said moving step (b) of said
17 plurality of cutters in said first direction of travel,
18 while intermittently interrupting the movement of the
19 plurality of cutters from said first direction of travel
20 to move the cutters in at least one direction of travel
21 which differs from said first direction of travel such
22 that each cutter produces at least one additional
23 respective brace-receiving slot in the polymeric foamed
24 material, until said plurality of cutters have moved
25 completely through the generally stationary block of
26 polymeric foamed material after which a plurality of
27 polymeric foamed material structures are produced with
28 each polymeric foamed material structure having a
29 plurality of brace-receiving slots.

1 69. A method for producing a plurality of polymeric
2 foamed material panels comprising the steps of:

3 • (a) cutting a polymeric foamed material in a
4 first direction with a plurality of cutters generally
5 moving in unison;

6 (b) cutting subsequently the polymeric foamed
7 material of step (a) in a second direction with said
8 plurality of cutters generally moving in unison;

9 (c) cutting, after said cutting step (b), the
10 polymeric foamed material of step (b) in said first
11 direction with said plurality of cutters generally moving
12 in unison;

13 (d) cutting, after said cutting step (c), the
14 polymeric foamed material of step (c) in a third
15 direction with said plurality of cutters generally moving
16 in unison wherein said third direction is generally
17 opposite to said second direction;

18 (e) cutting, after said cutting step (d), the
19 polymeric foamed material of step (d) in said first
20 direction with said plurality of cutters generally moving
21 in unison until said cutters have cut through the
22 polymeric foamed material of step (d) to produce a

23 plurality of polymeric foamed material structures having
24 brace-receiving configurations; and
25 (f) sliding brace members into the brace-
26 receiving configurations of said polymeric foamed
27 material structures of step (e) to produce a plurality of
28 polymeric foamed material panels with each polymeric
29 foamed material panel having one of said brace members.

1 70. A method for producing a polymeric foamed
2 material structure having a slot comprising the steps of:

3 (a) cutting with a cutter a polymeric foamed
4 material until reaching a preslot cut point;

5 (b) cutting subsequently a first path in the
6 polymeric foamed material with the cutter from the
7 preslot cut point until reaching a first cut point;

8 (c) moving the cutter in the polymeric foamed
9 material of step (b) a predetermined distance from the
10 first cut point to a second cut point; and

11 (d) cutting subsequently from the second cut
12 point a second path in the polymeric foamed material of
13 step (c) with the cutter until the cutter reaches a
14 postslot cut point to produce a polymeric foamed material
15 structure having a slot.

1 71. The method of claim 70 wherein said slot of
2 step (d) has a width equal to about twice said predetermined
3 distance of step (c).

1 72. The method of claim 70 wherein said cutter is a
2 hot wire cutter having a wire diameter with a generally known
3 diameter measurement, and said slot of step (d) has a width
4 equal to about twice the generally known diameter measurement
5 of the wire diameter.

1 73. The method of claim 72 additionally comprising
2 computer operating said hot wire cutter.

1 74. The method of claim 70 additionally comprising
2 sliding a stud member into said slot of step (d).

1 75. The method of claim 73 additionally comprising
2 sliding a stud member into said slot of step (d).

1 76. A method for producing at least one polymeric
2 foamed material structure having at least one slot comprising
3 the steps of:

- 4 (a) providing at least one cutter;
5 (b) cutting with the cutter of step (a) a
6 polymeric foamed material until the cutter reaches at
7 least one respective preslot cut point;
8 (c) cutting subsequently with cutter from the
9 respective preslot cut point of step (b) at least one
10 respective path in the polymeric foamed material of step
11 (b) until the cutter reaches at least one first cut
12 point;
13 (d) forming with the cutter in the polymeric
14 foamed material of step (c) at least one respective off-
15 set path communicating with the respective path of step
16 (c) to form at least one slot within the polymeric foamed
17 material of step (c); and
18 (e) cutting subsequently the polymeric foamed
19 material of step (d) with the cutter until the cutter has
20 cut through the polymeric foamed material of step (d),
21 producing at least one polymeric foamed structure having
22 at least one slot.

1 77. The method of claim 76 wherein said at least
2 one respective path has at least one respective path length,
3 and said at least one respective off-set path communicates
4 with the at least one respective path along the at least one
5 respective path length of the at least one respective path,
6 such that the at least one respective path and the least one
7 respective off-set path together form the at least one slot
8 within the polymeric foamed material of step (c).

1 79. The method of claim 78 additionally comprising
2 sliding a plurality of stud members into the plurality of
3 slots.

1 80. The method of claim 79 additionally comprising
2 computer-operating said plurality of hot wire cutters.

AN IMPROVED SYNTHETIC PANEL AND METHOD

Abstract Of The Disclosure

A method for producing a polymeric foamed material panel including the steps of providing a polymeric foamed material; and cutting (e.g. hot wire cutting) the polymeric foamed material until reaching a preconfiguration cut point. The method further includes cutting subsequently from the preconfiguration cut point a brace-receiving configuration in the polymeric foamed material; and sliding a brace member into the brace-receiving configuration to produce a polymeric foamed material panel. A method for forming a structure comprising engaging together a pair of polymeric foamed material panels produced in accordance with the method for producing a polymeric foamed material panel. A polymeric foamed material panel comprising a panel consisting of a polymeric foamed material, and a brace-receiving-configured slot disposed in the polymeric foamed material of the panel. A brace member is disposed in the brace-receiving-configured slot in the polymeric foamed material of the panel. The brace-receiving-configured slot includes at least one seared wall.

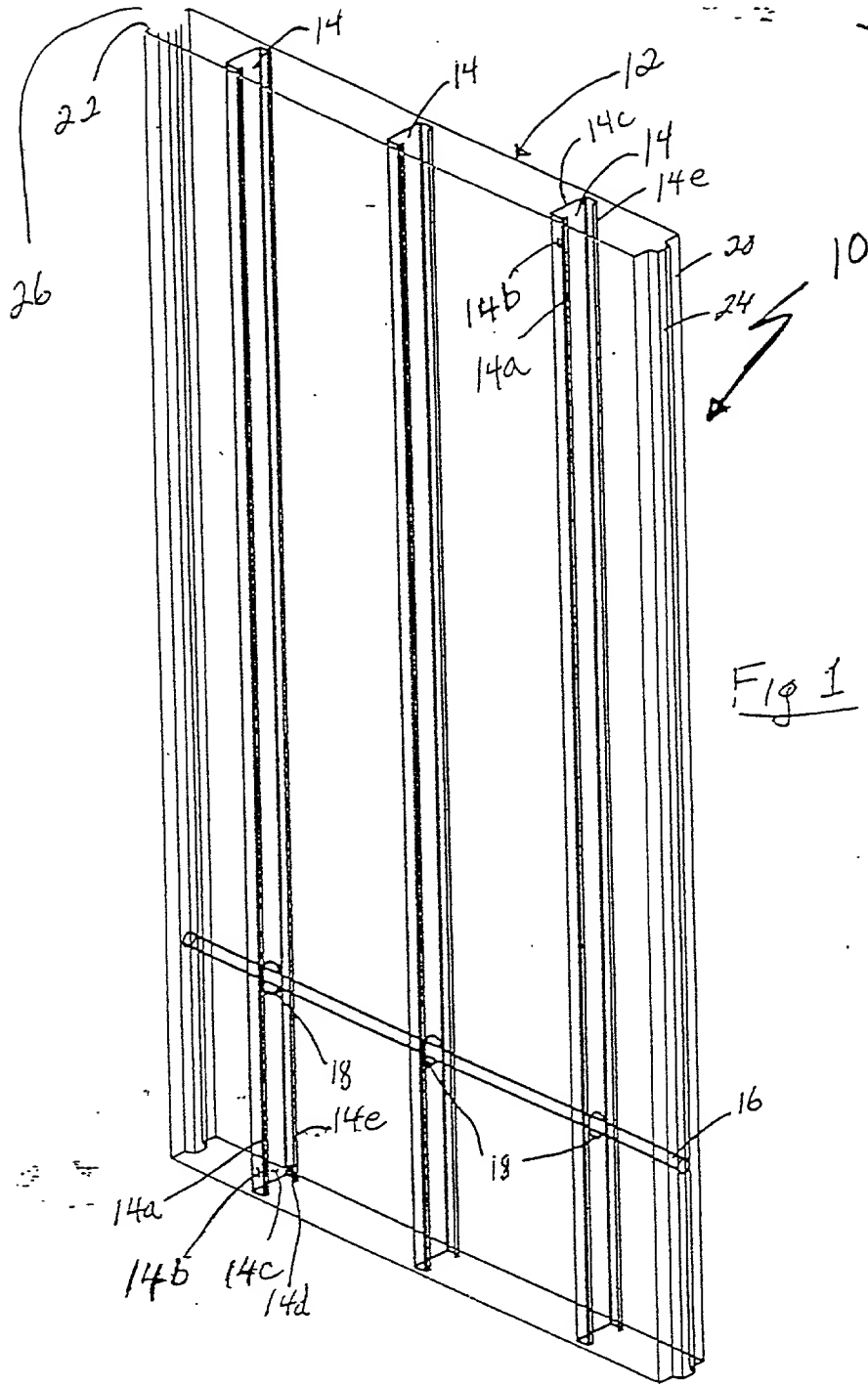
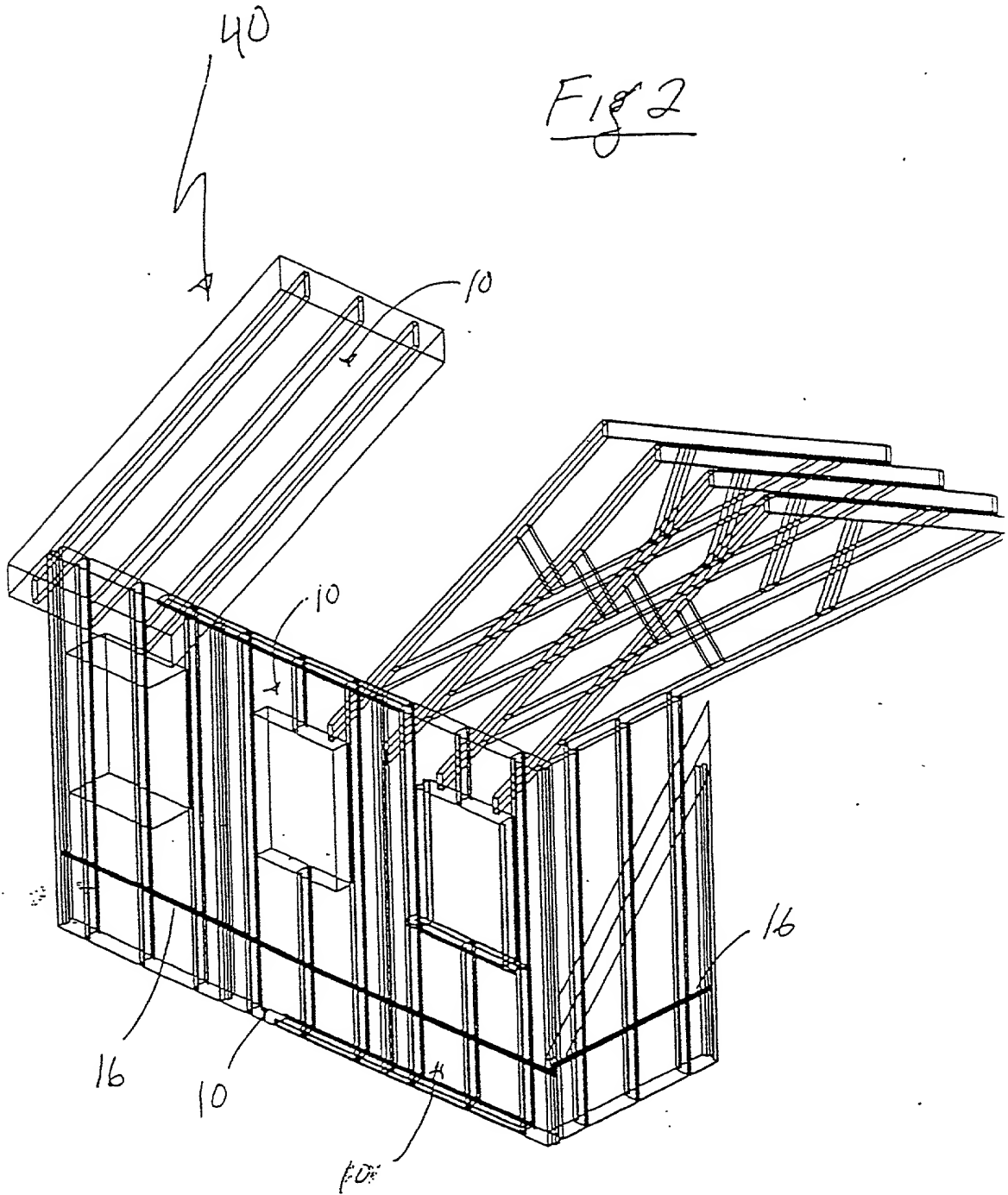
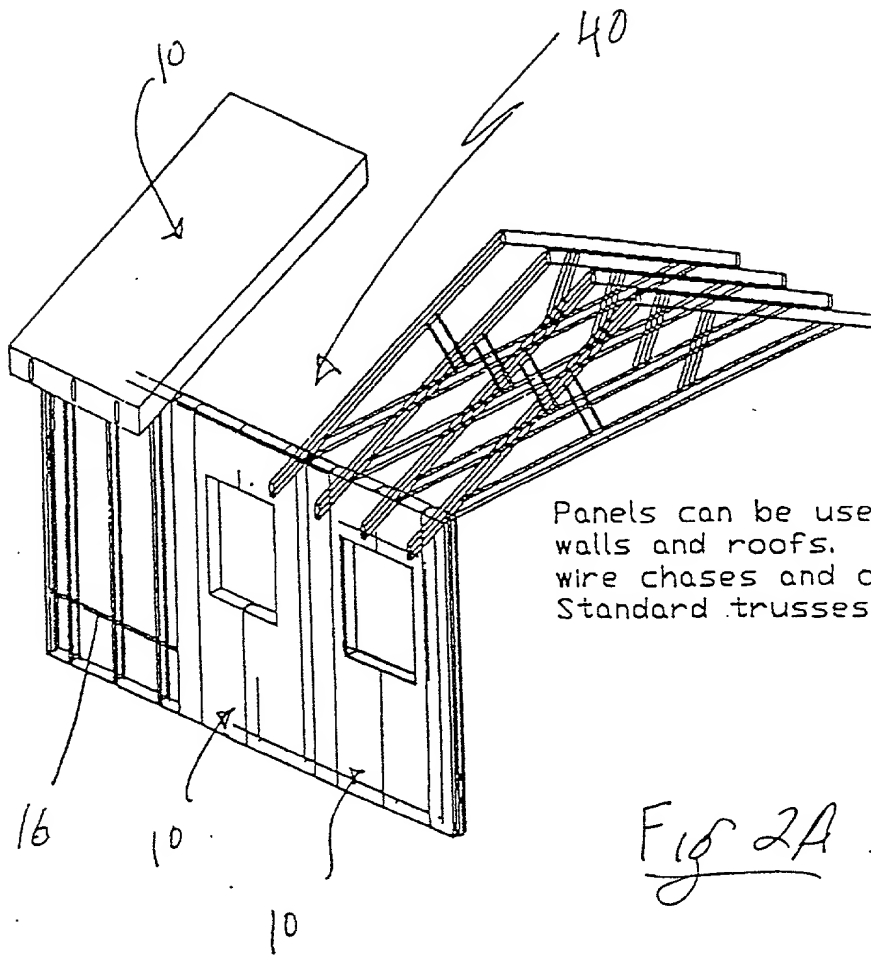


Fig 2





Panels can be used for walls and roofs. Pre-engineered wire chases and openings. Standard trusses can be used

Fig 2A

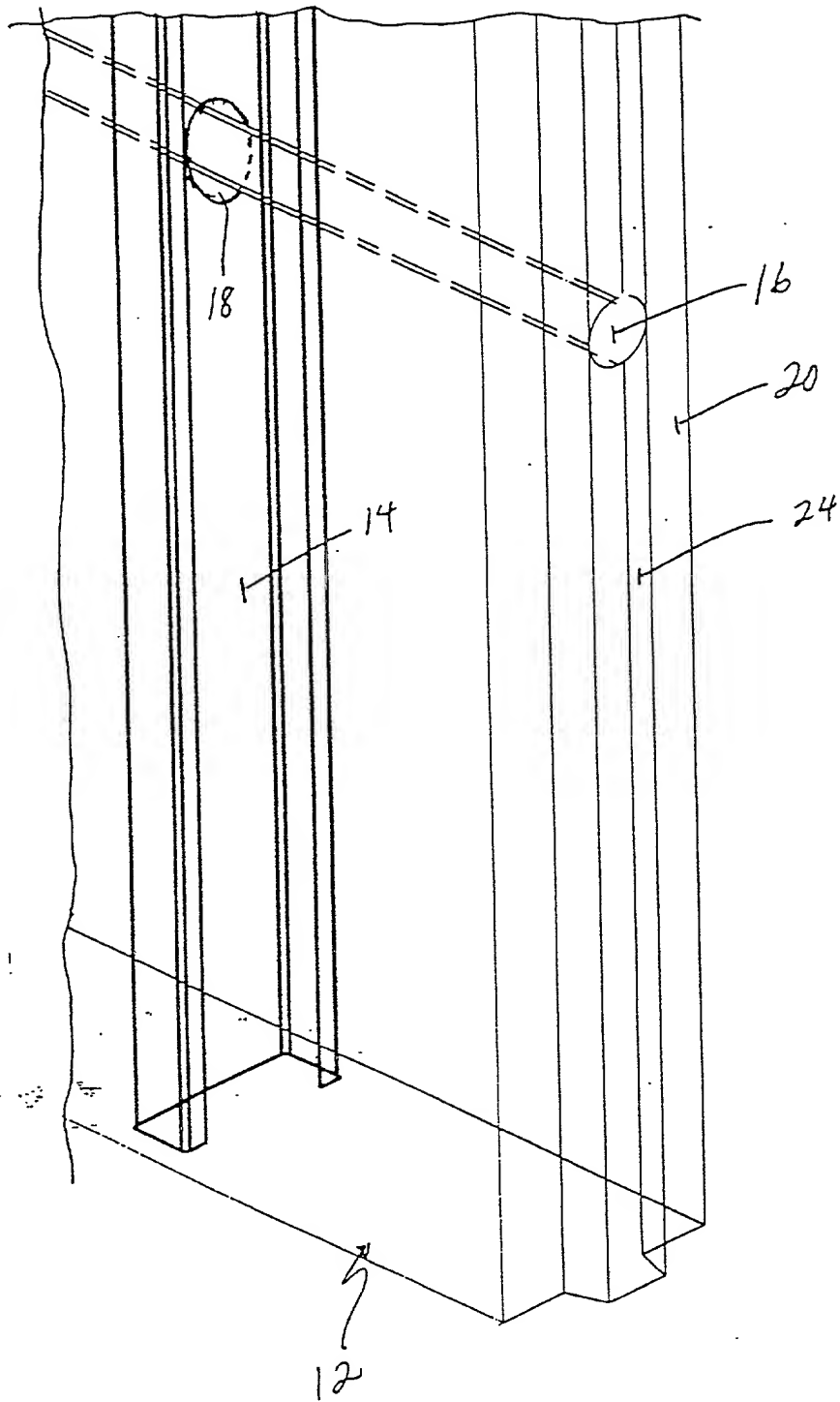


Fig. 3

Fig 4

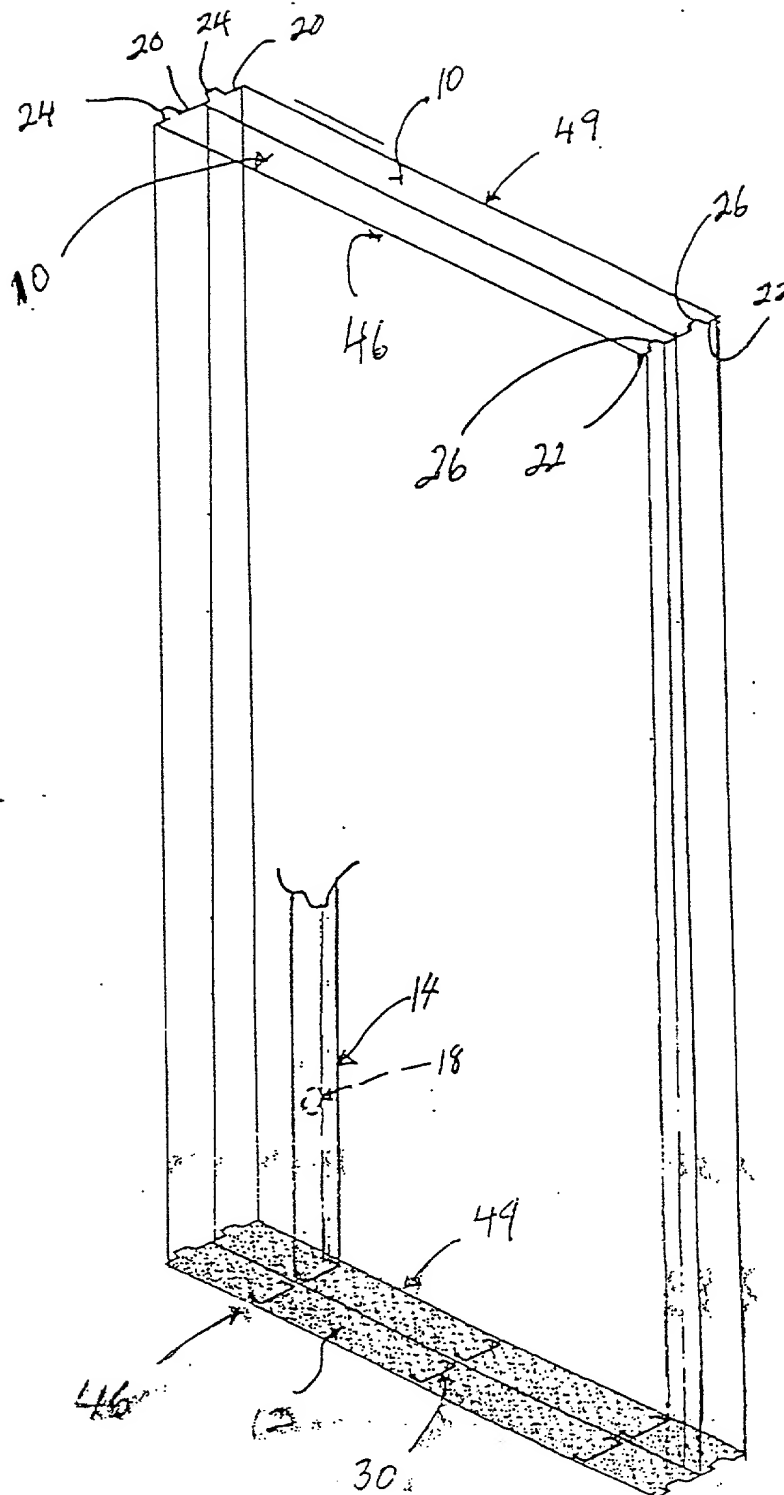
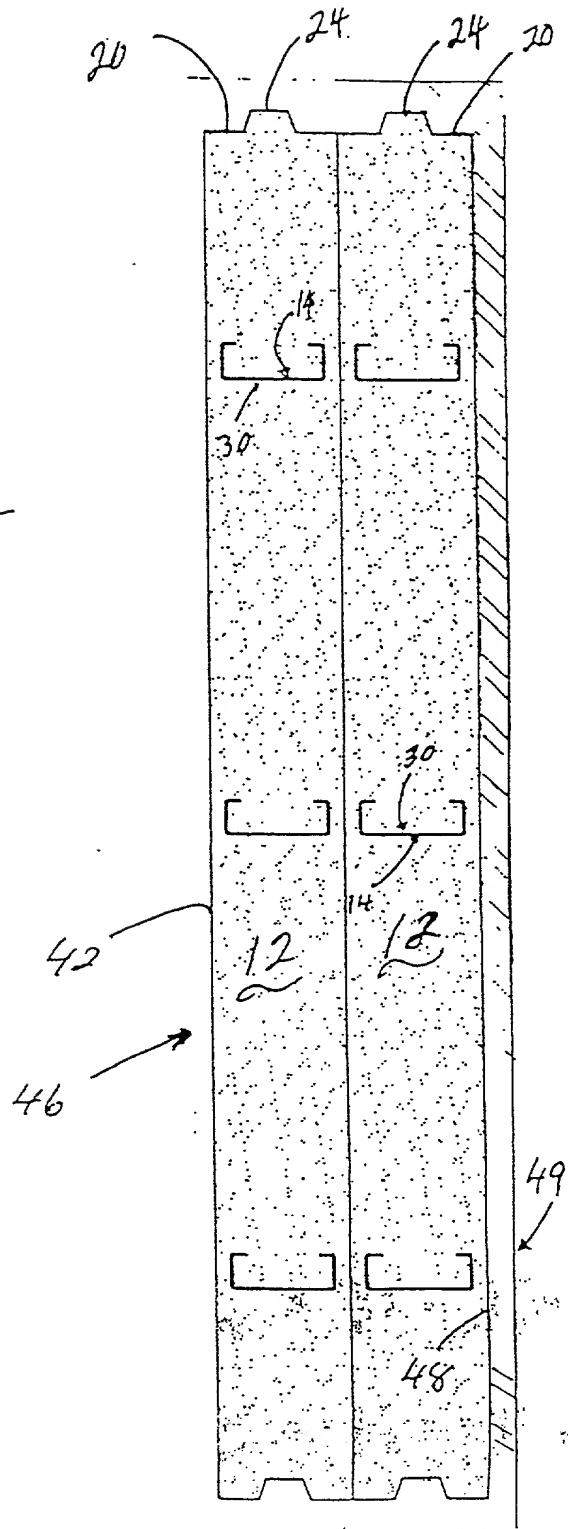


FIG 5



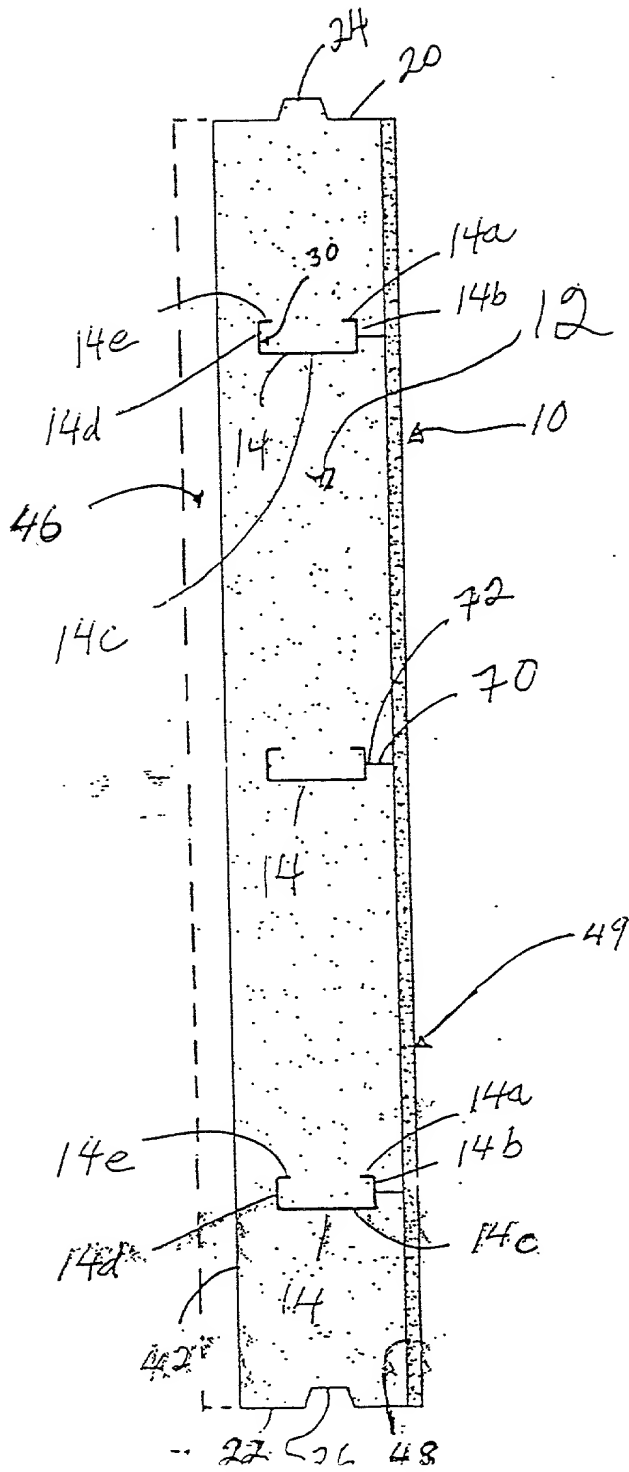


Fig 6

Sheet rock

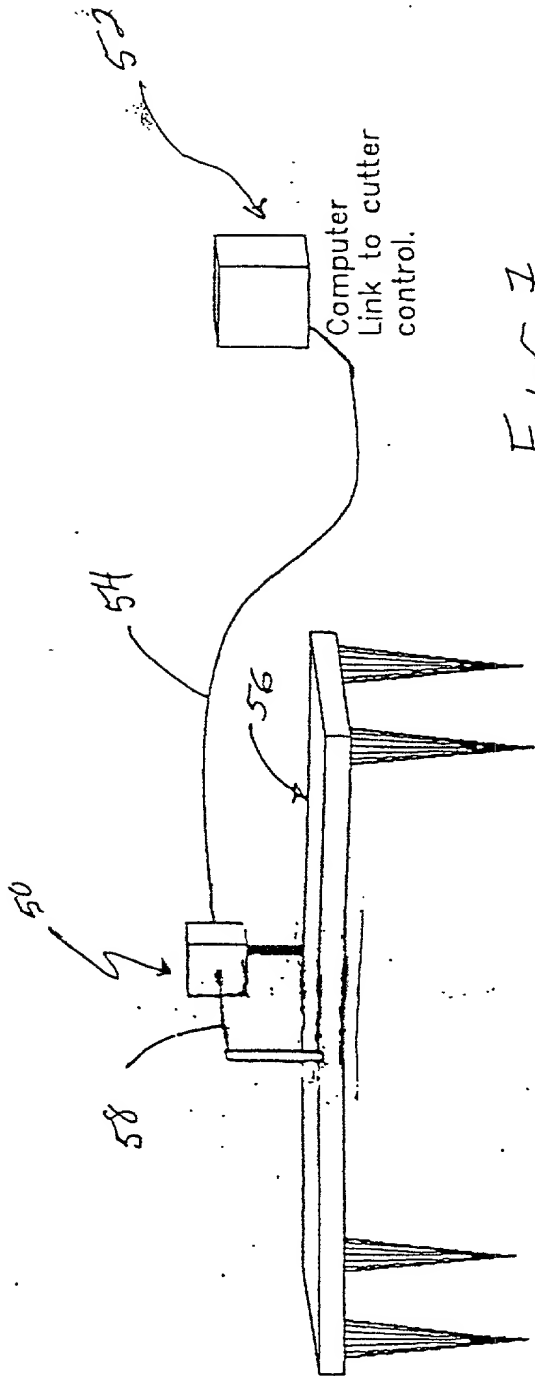


Fig 7

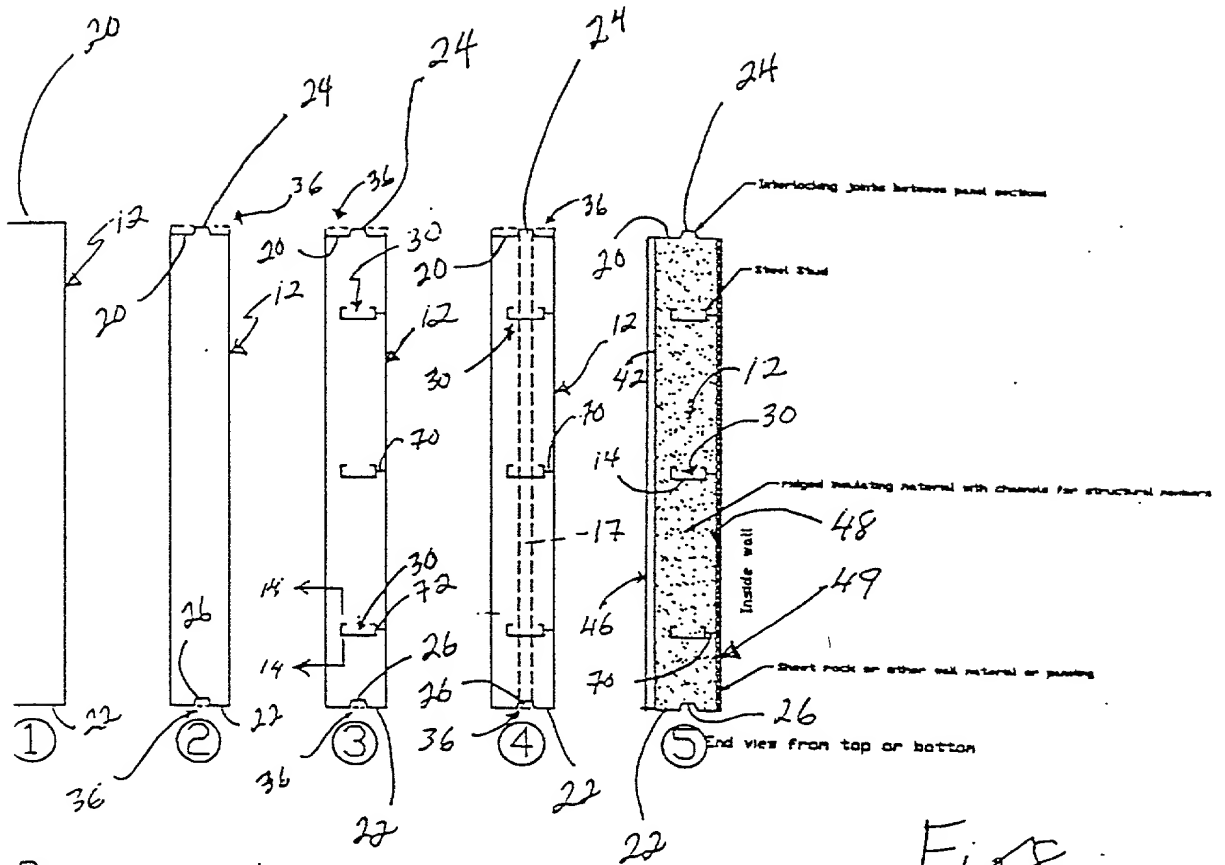
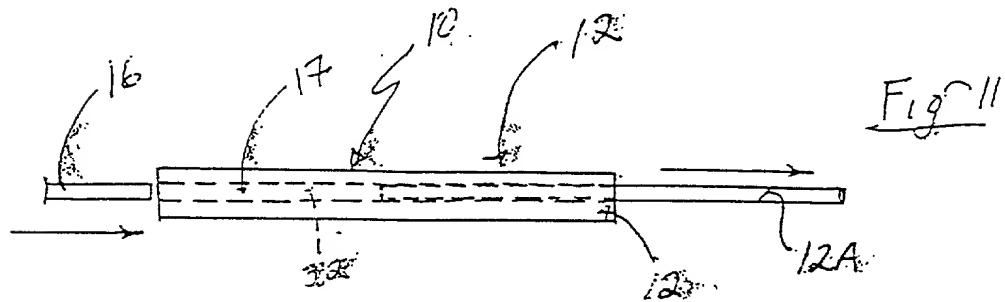
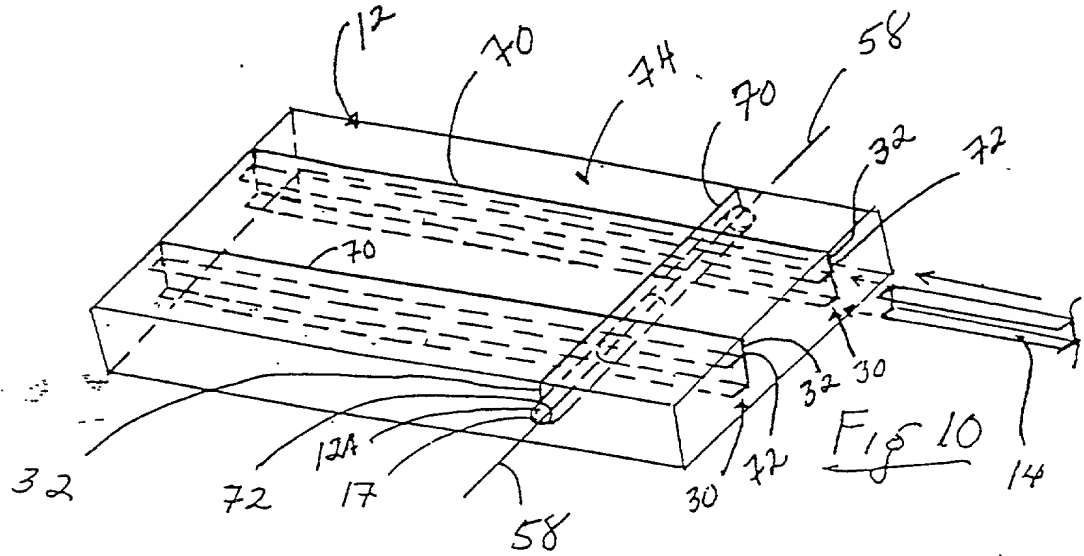
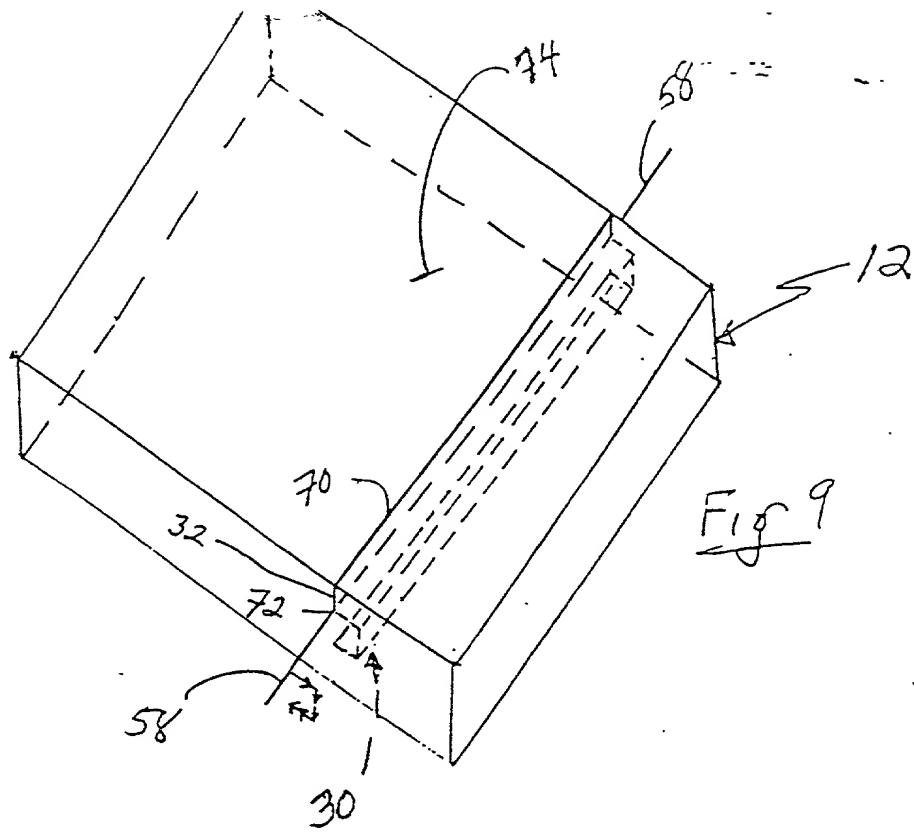
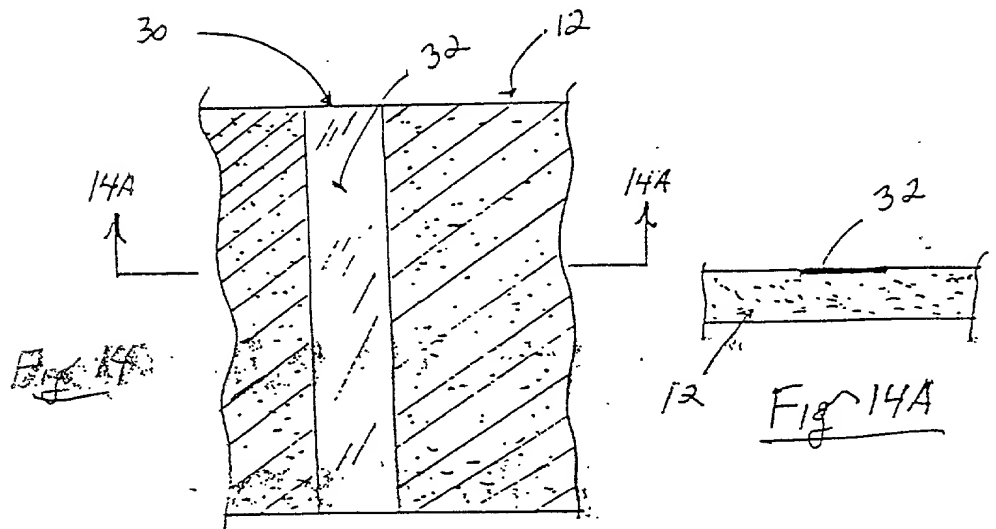
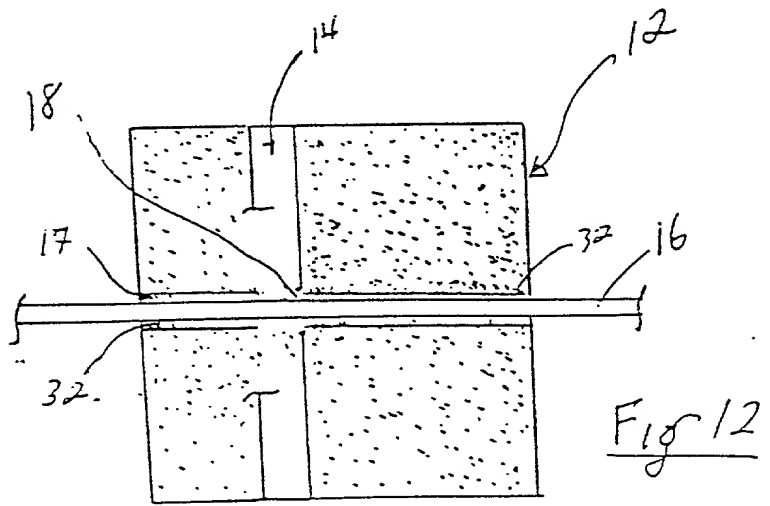
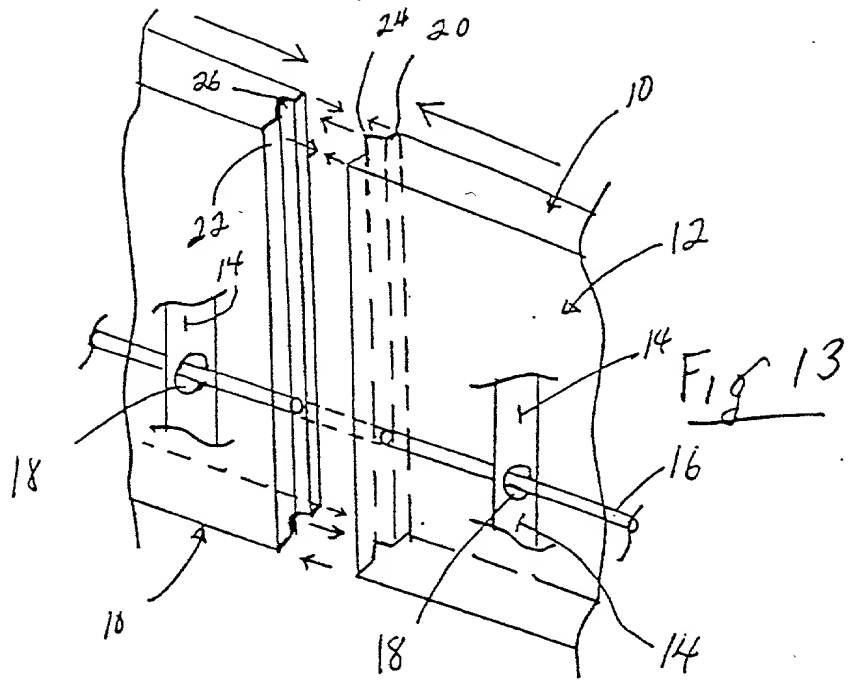


Fig 8

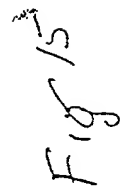
Process steps:

1. Solid block of core material
2. Cut outline shape with computer added design
3. Cut shape of supporting members as required using computer added design
4. Cut electrical chases as required
5. Install or applied inside and outside covering as required





oh



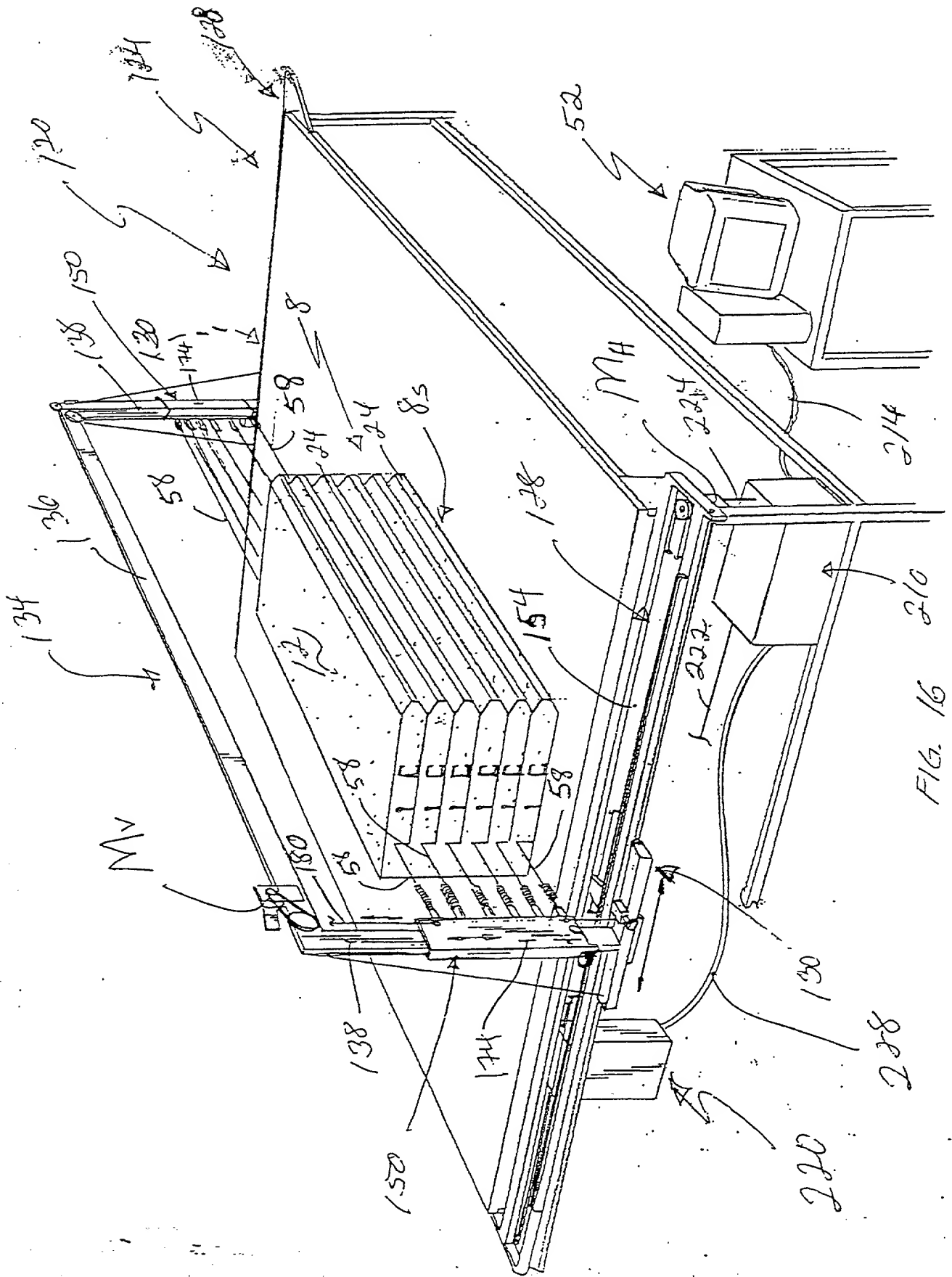
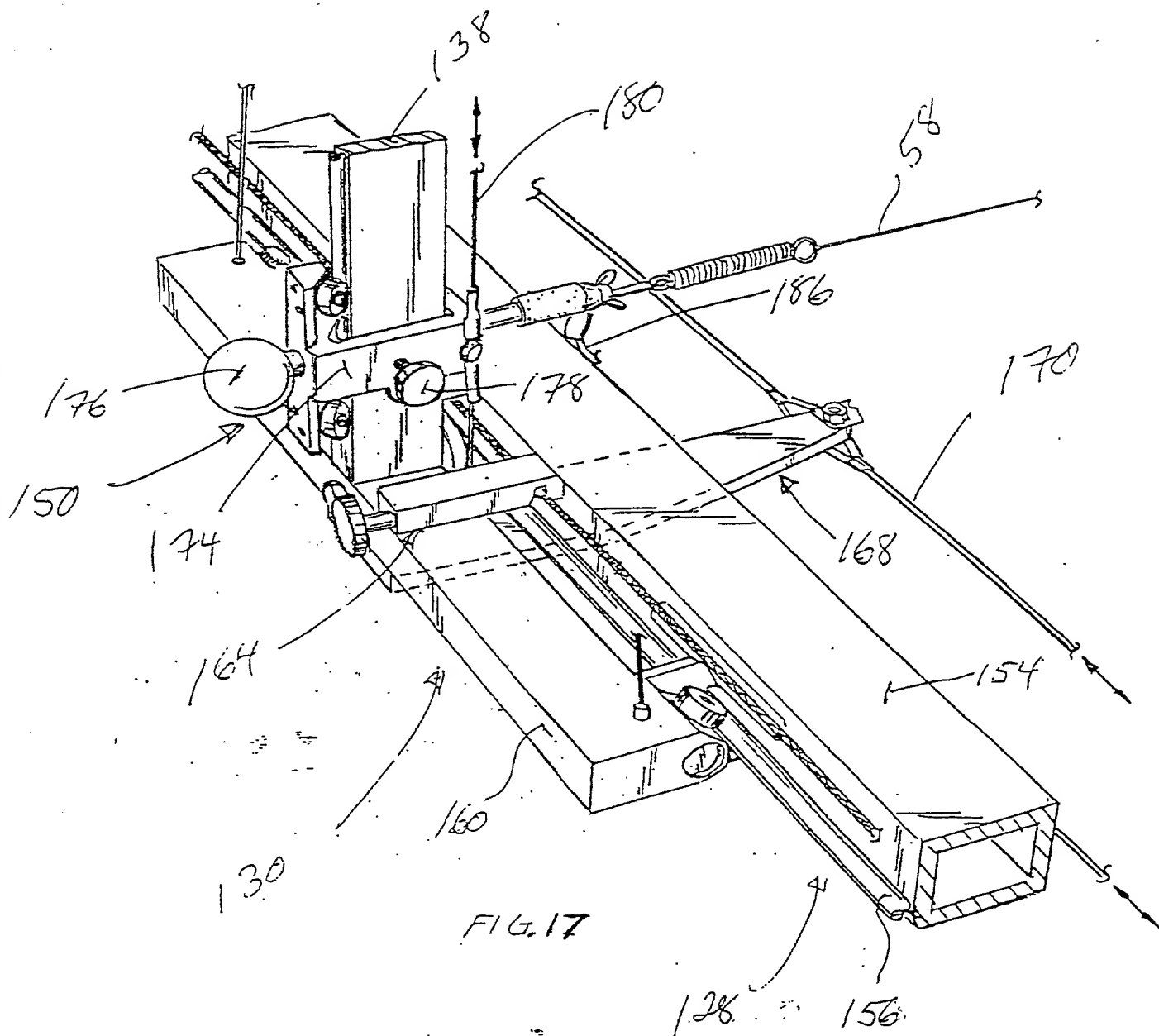


FIG. 16



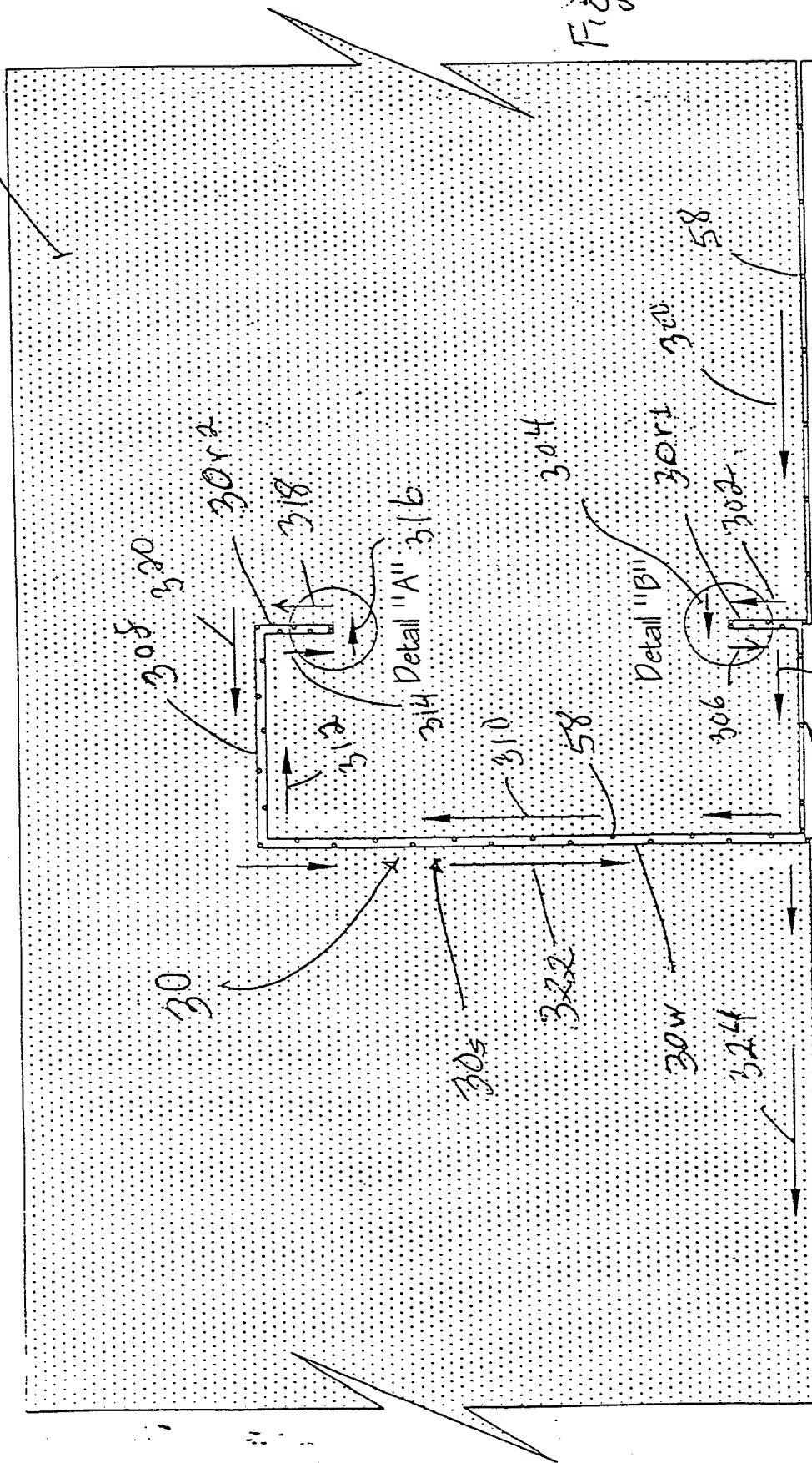


Fig 20

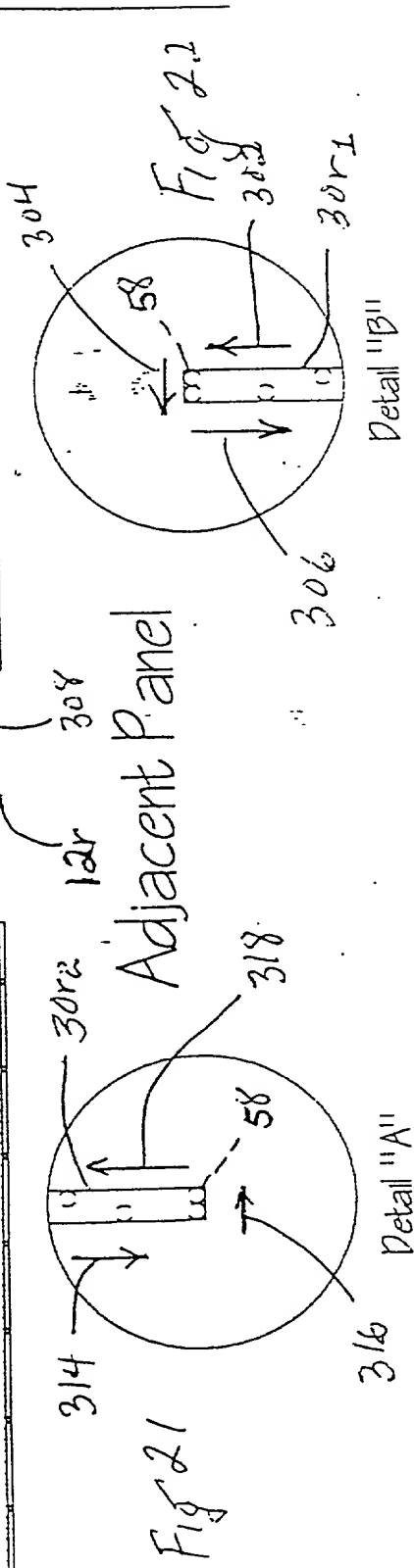
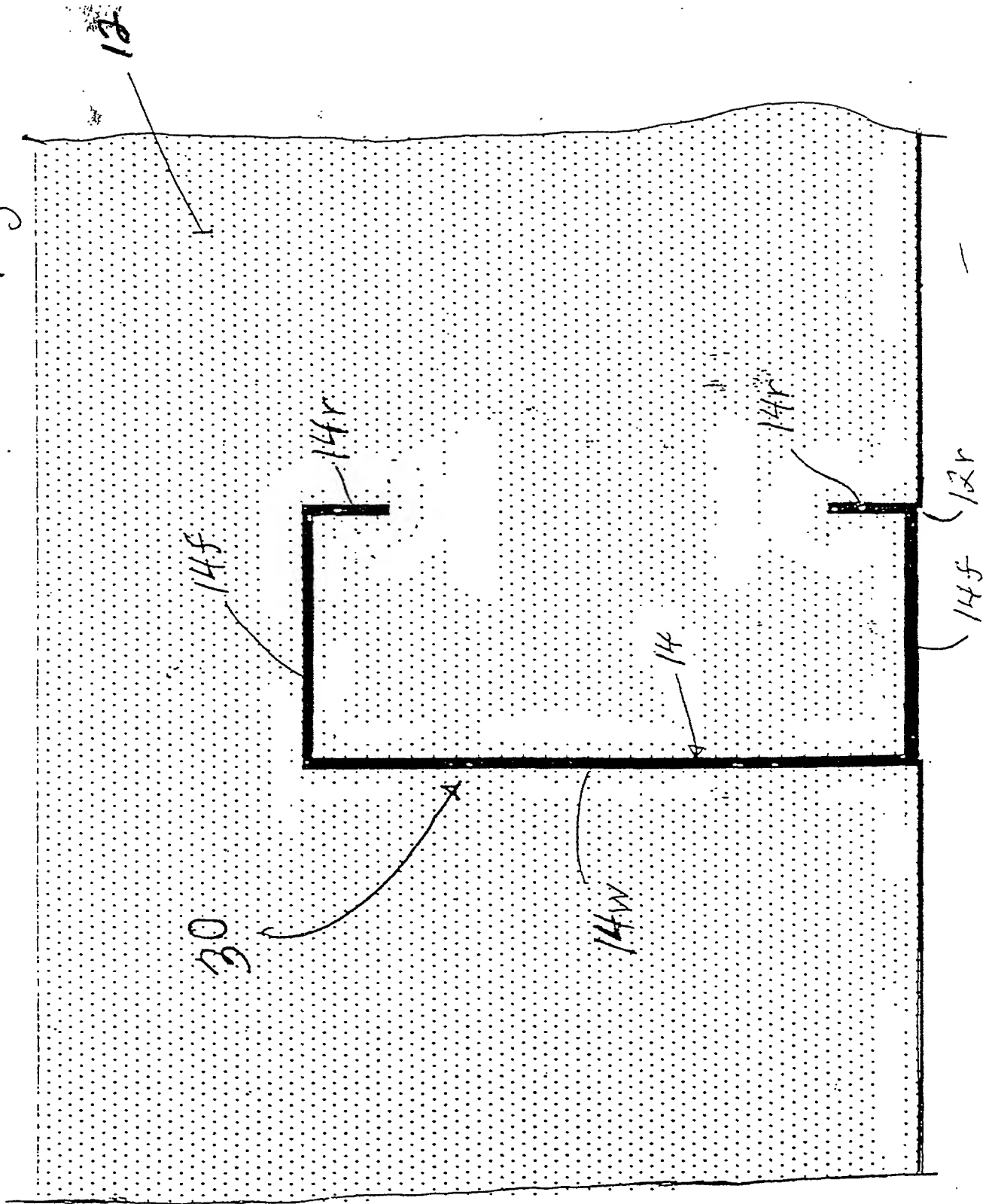


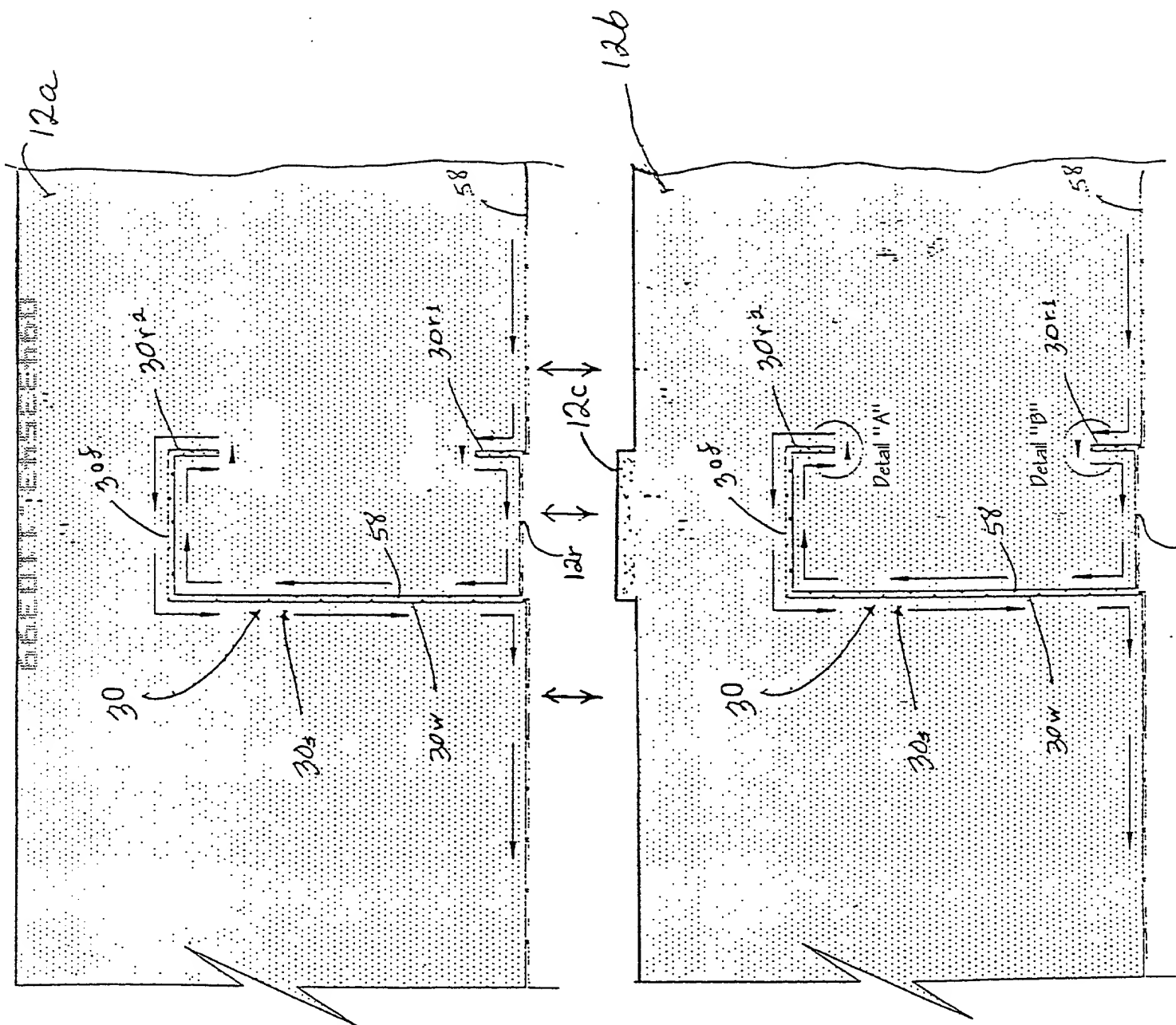
Fig 21

Adjacent Panel

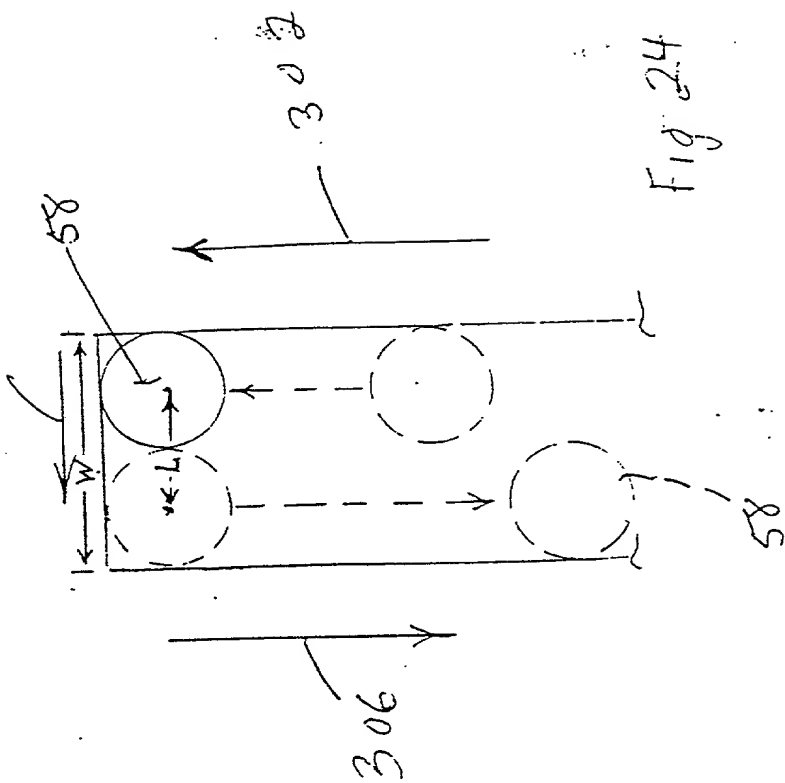
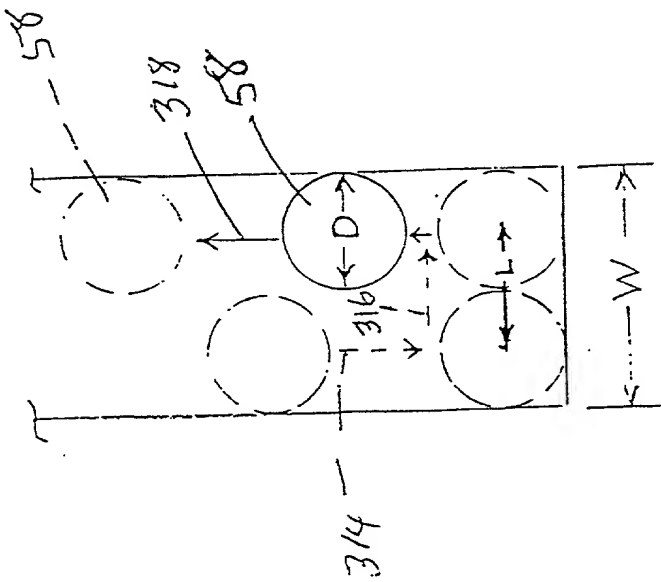
Fig 20A



20B



500T-00000004



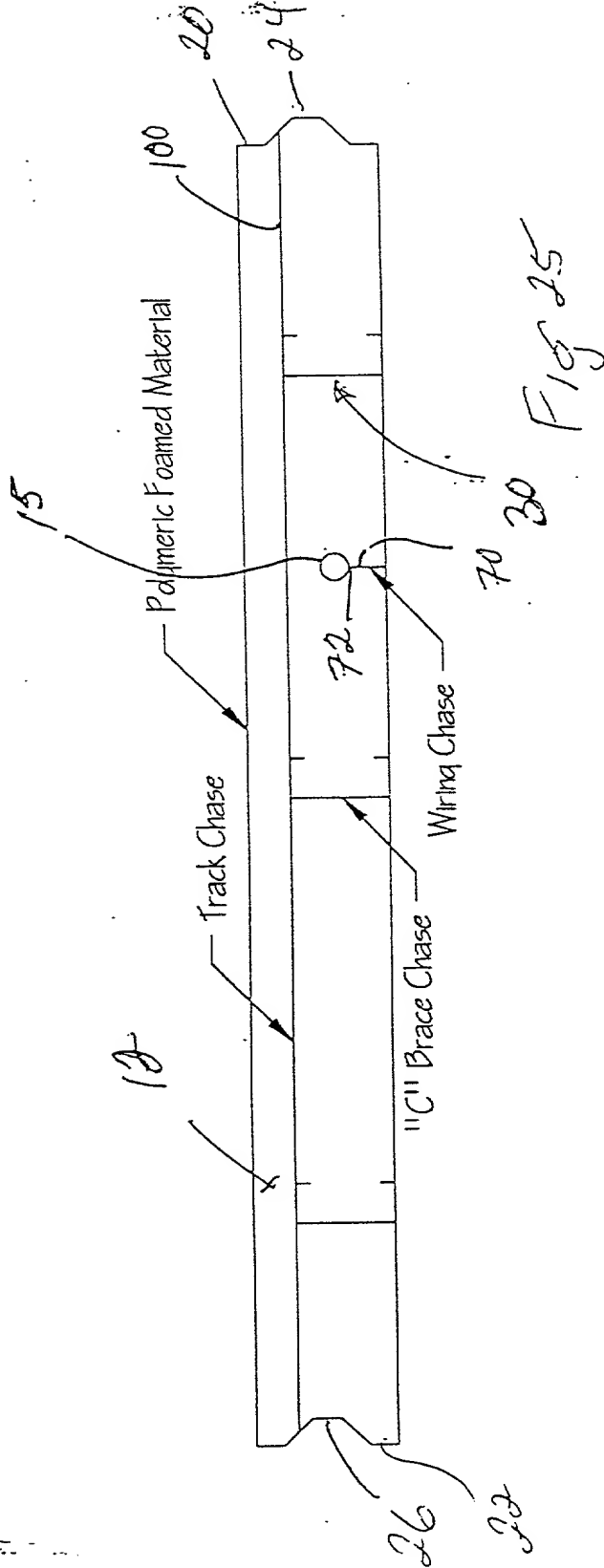


Fig 26

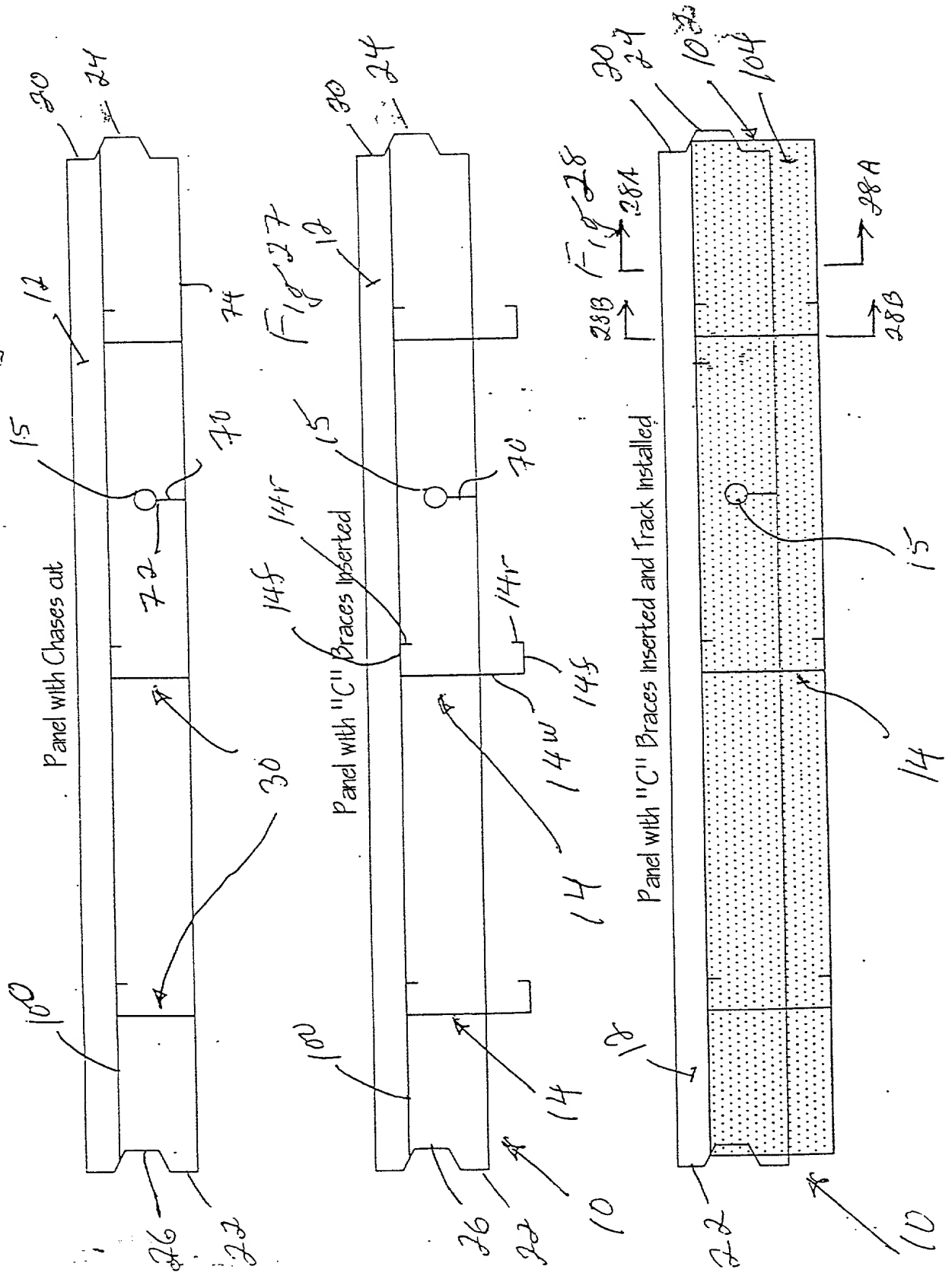


FIG. 28A

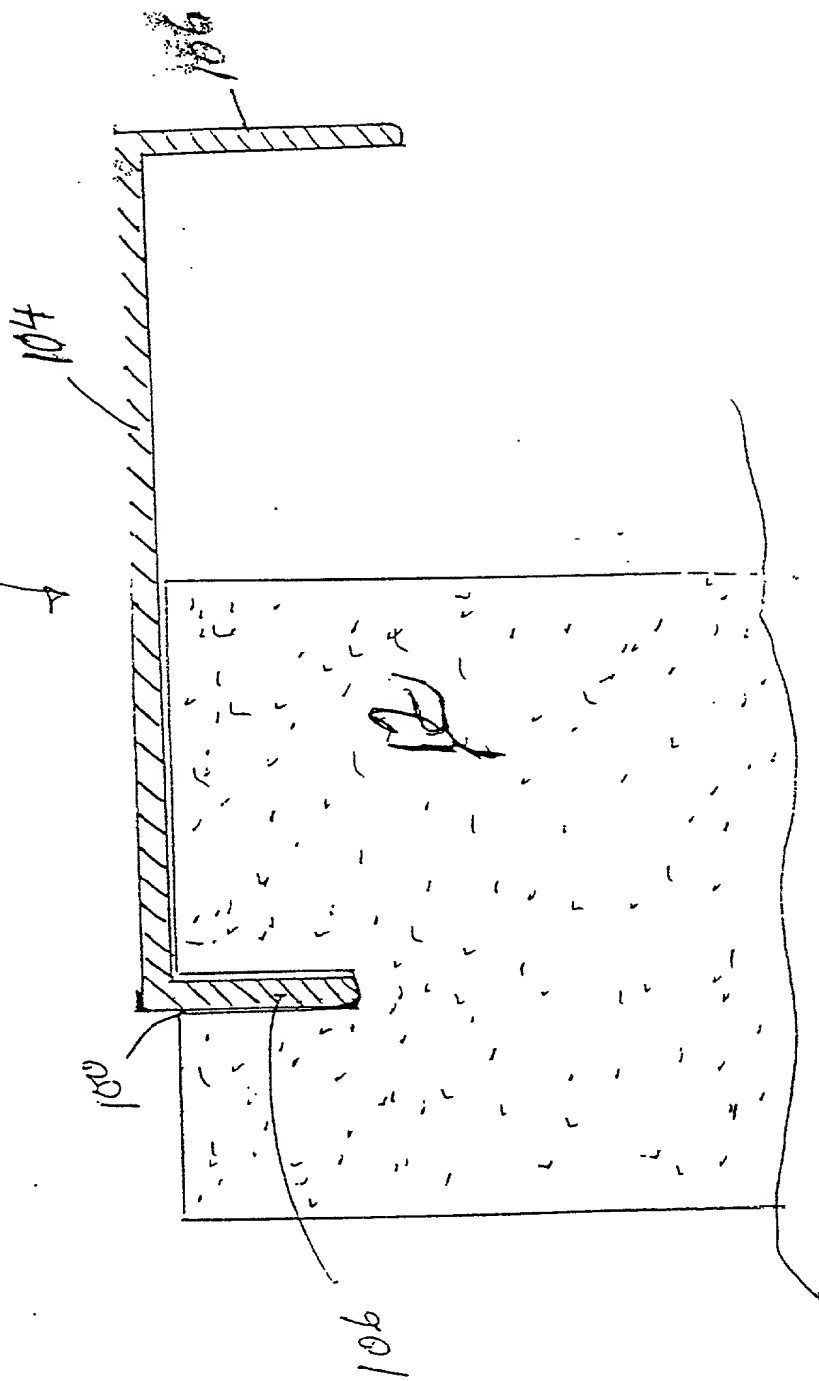


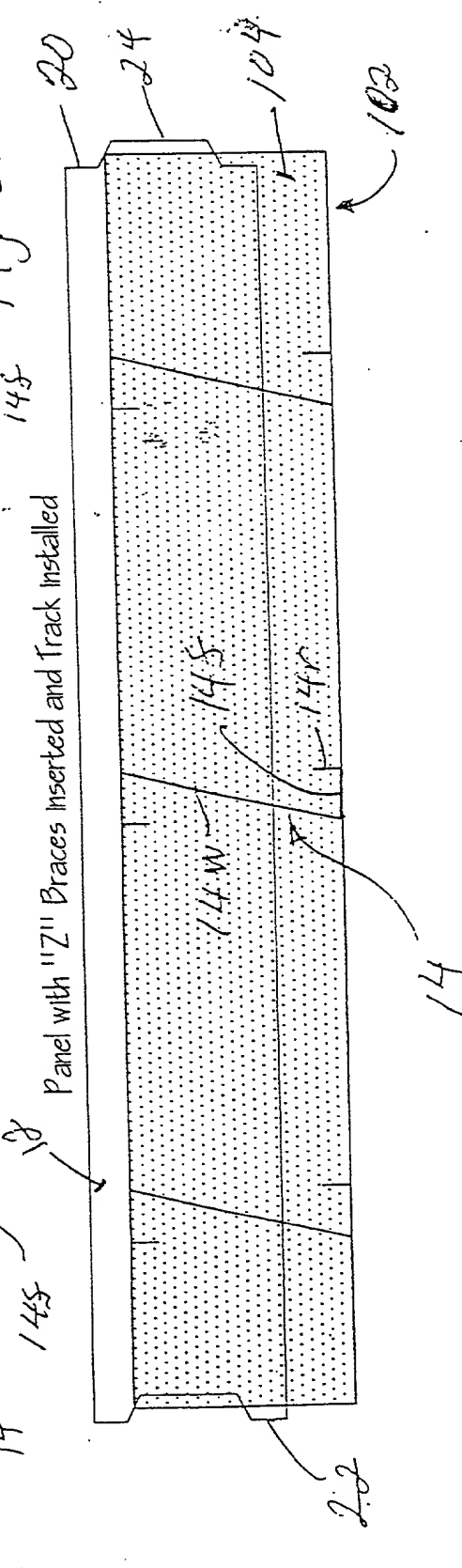
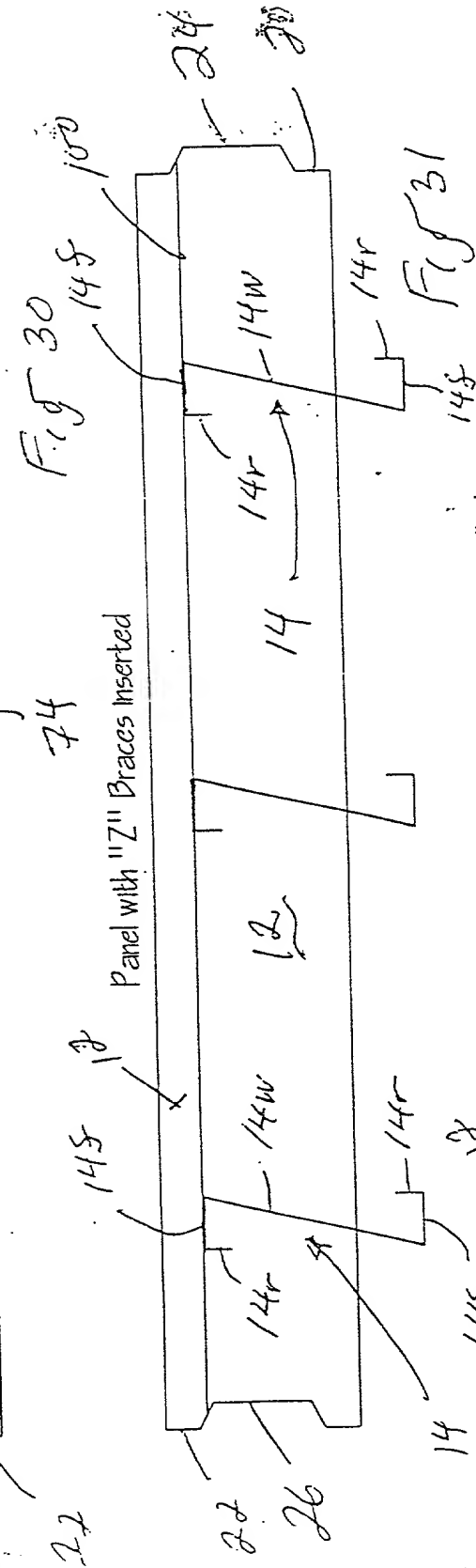
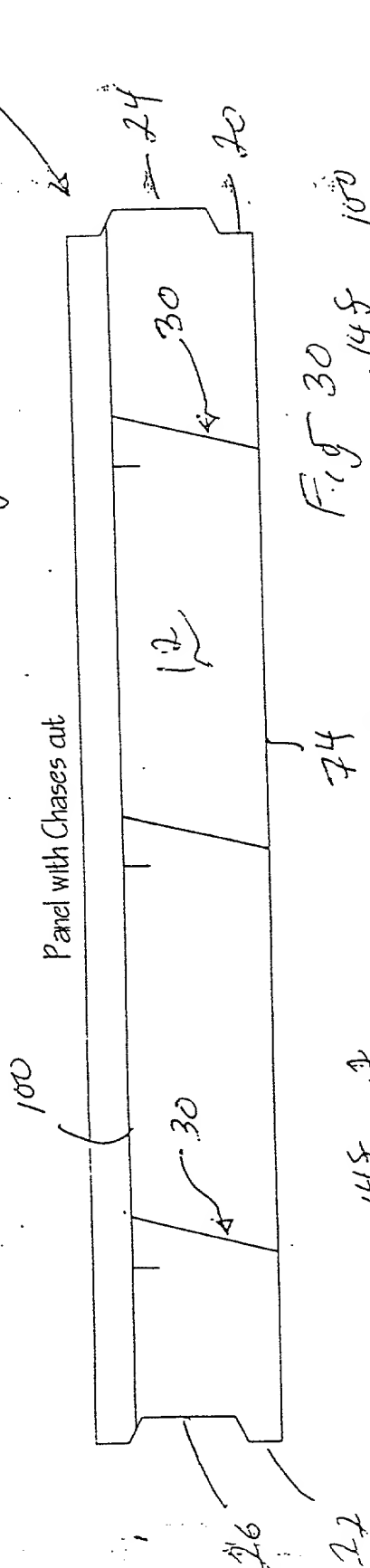
Fig 28A

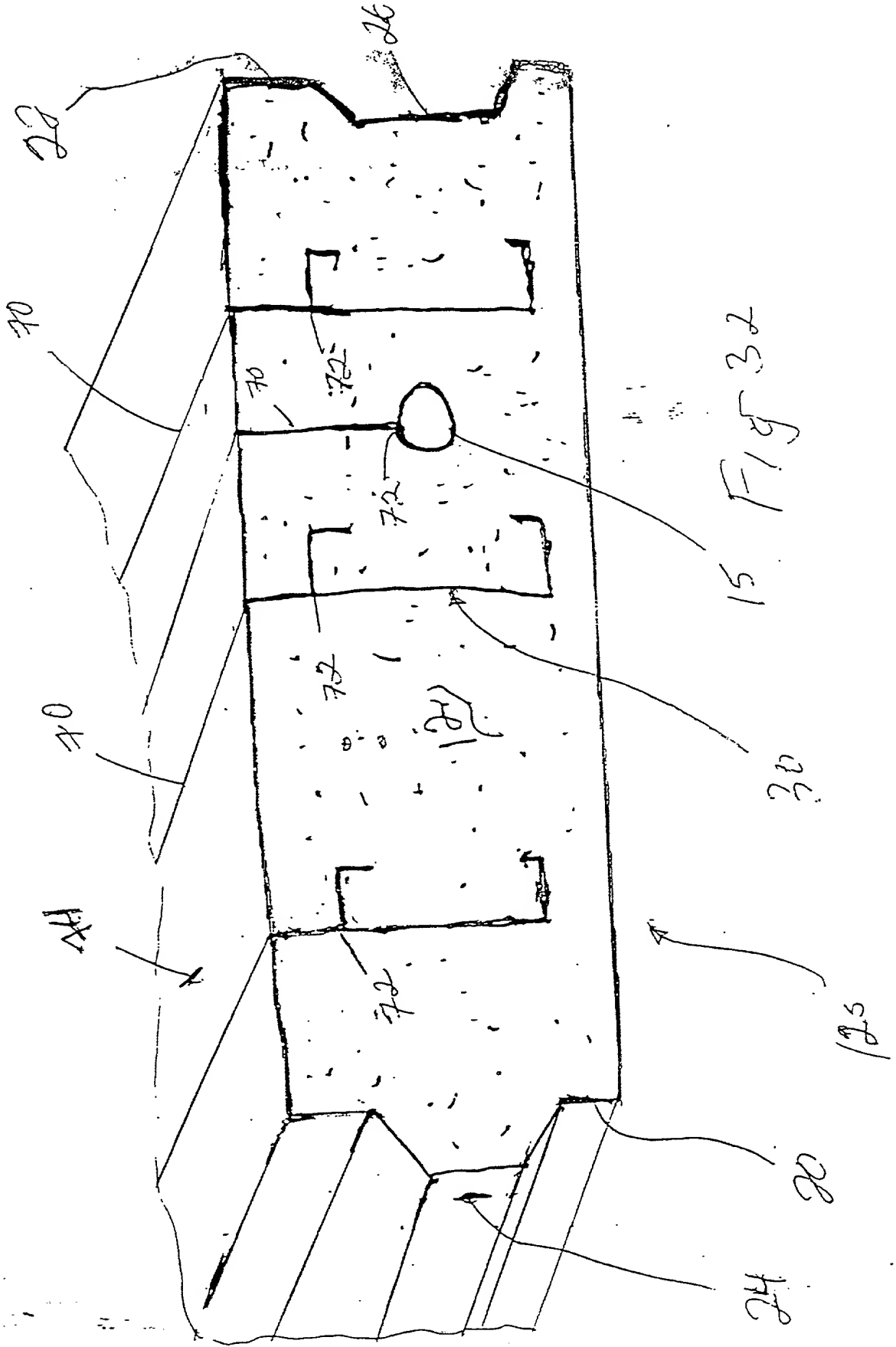
102

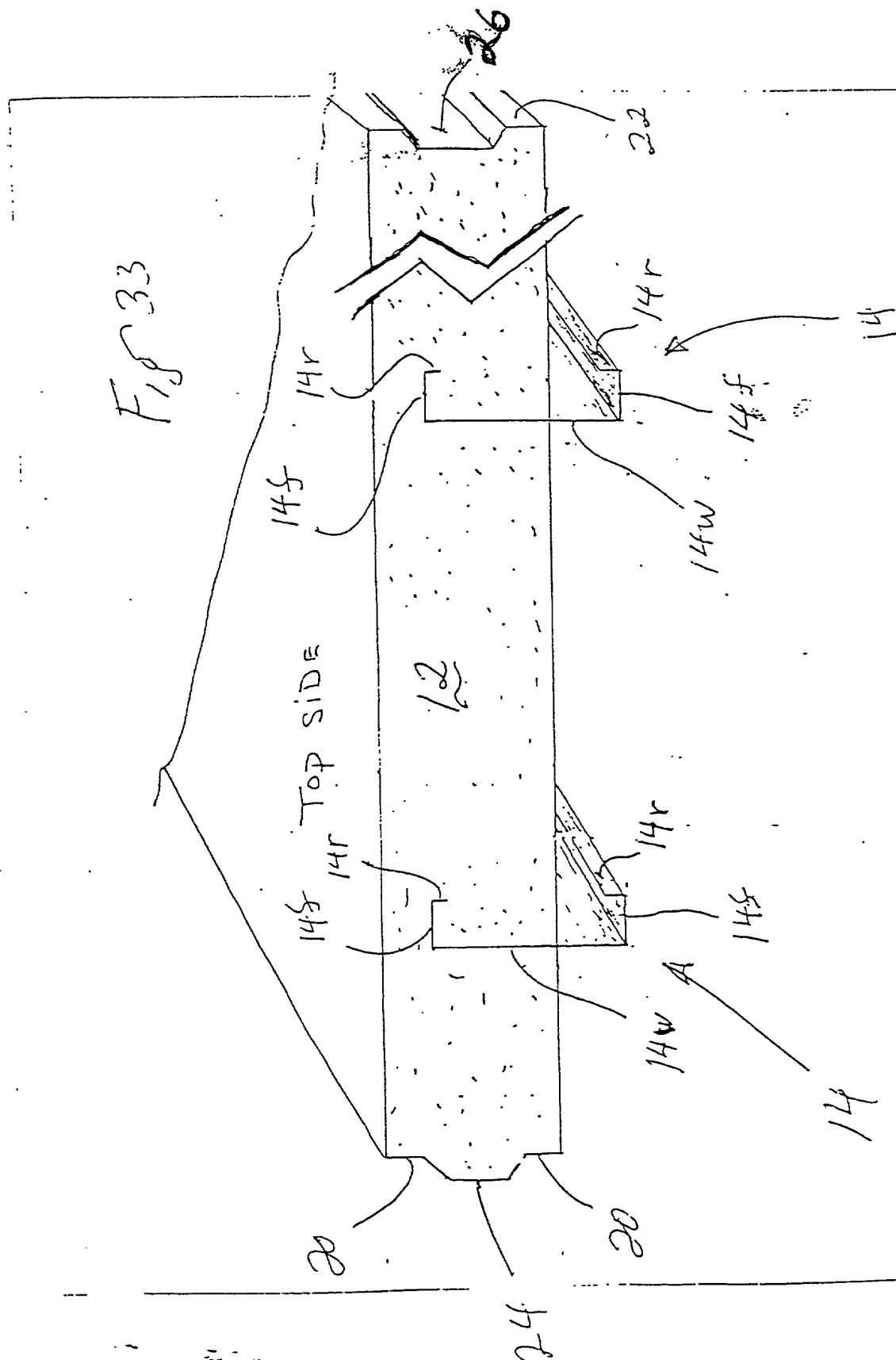


Feb 28 B

FIG 29









660011-454460

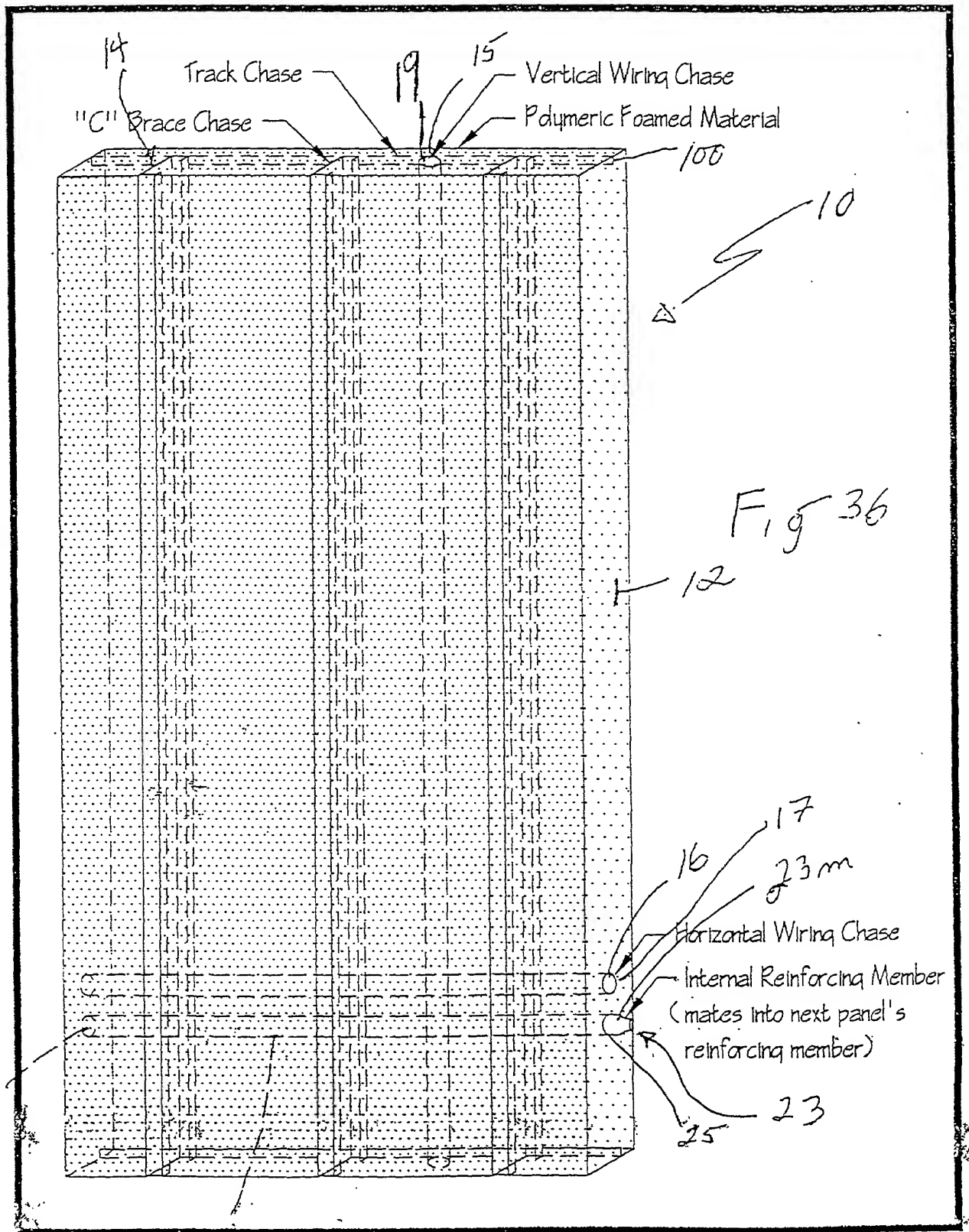
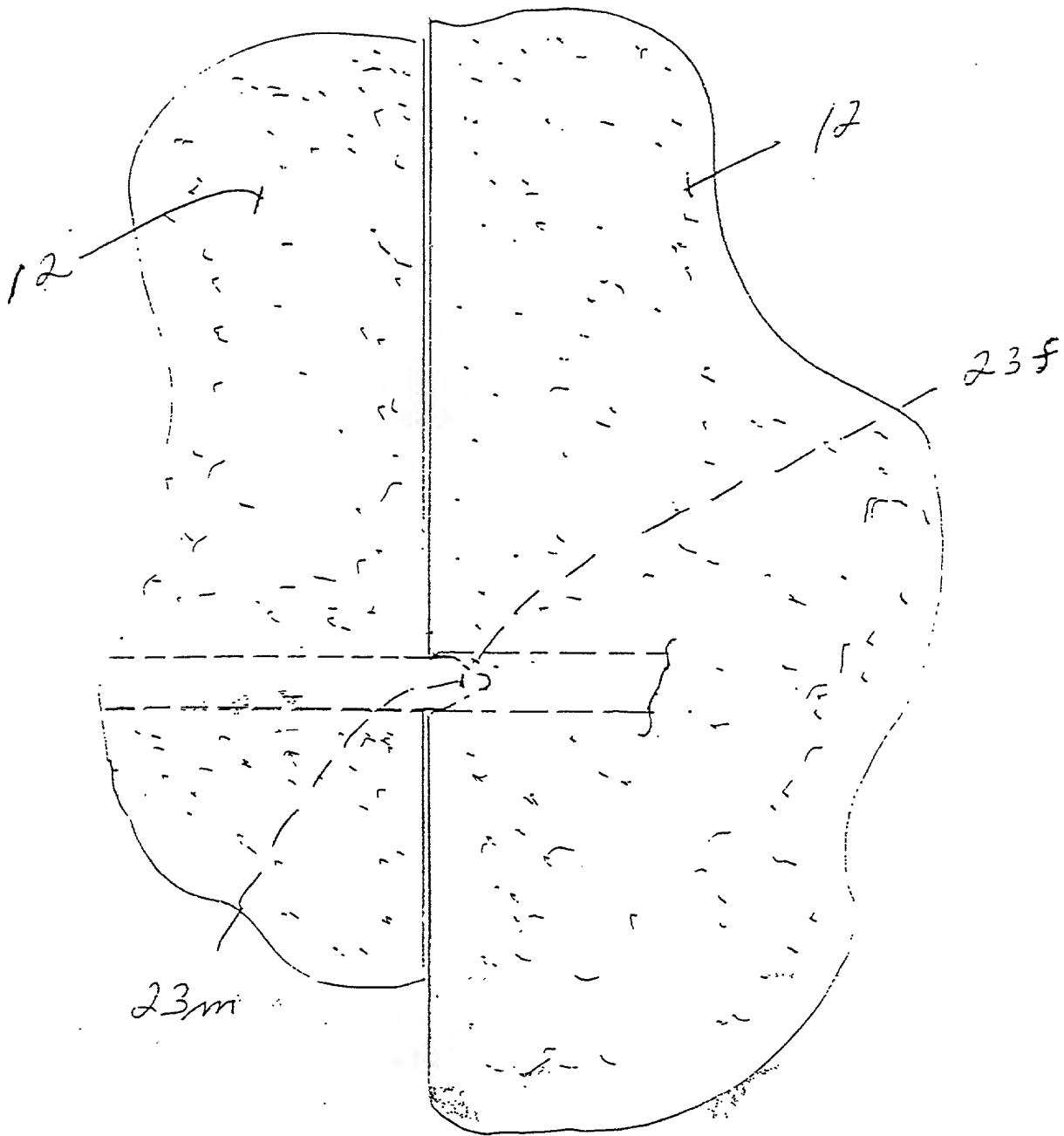
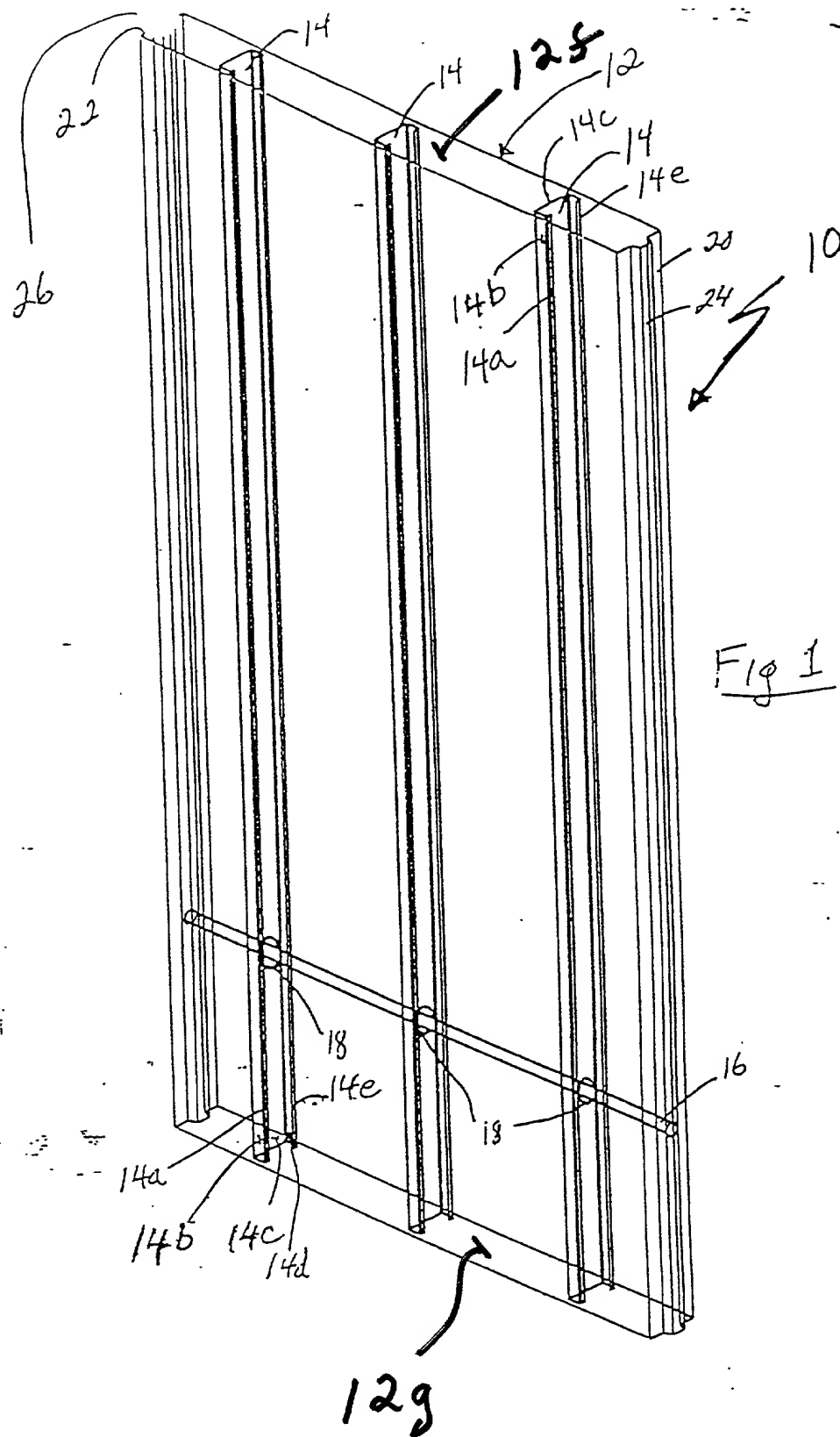


Fig. 36

Fig 37





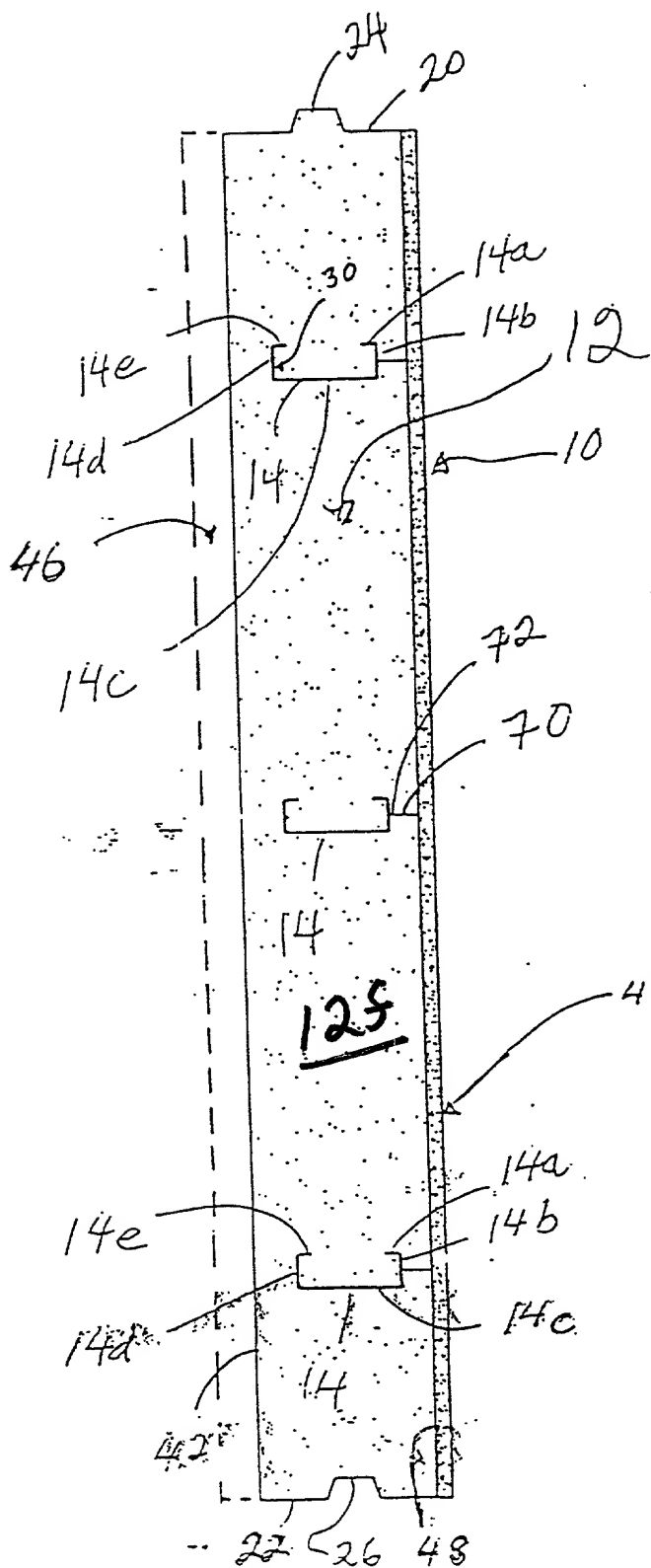
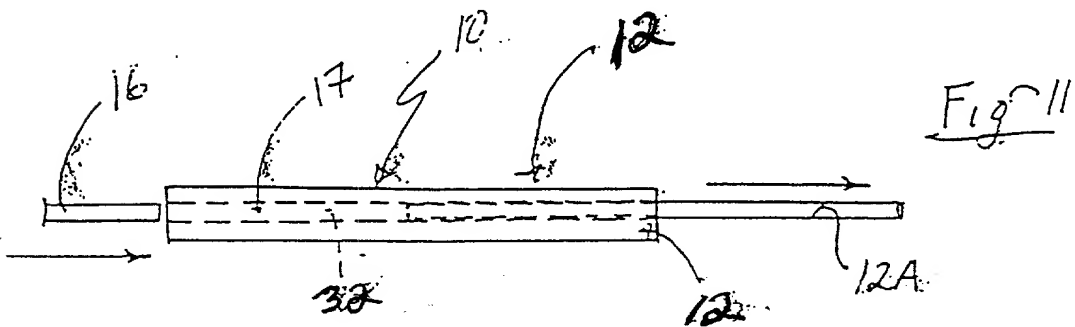
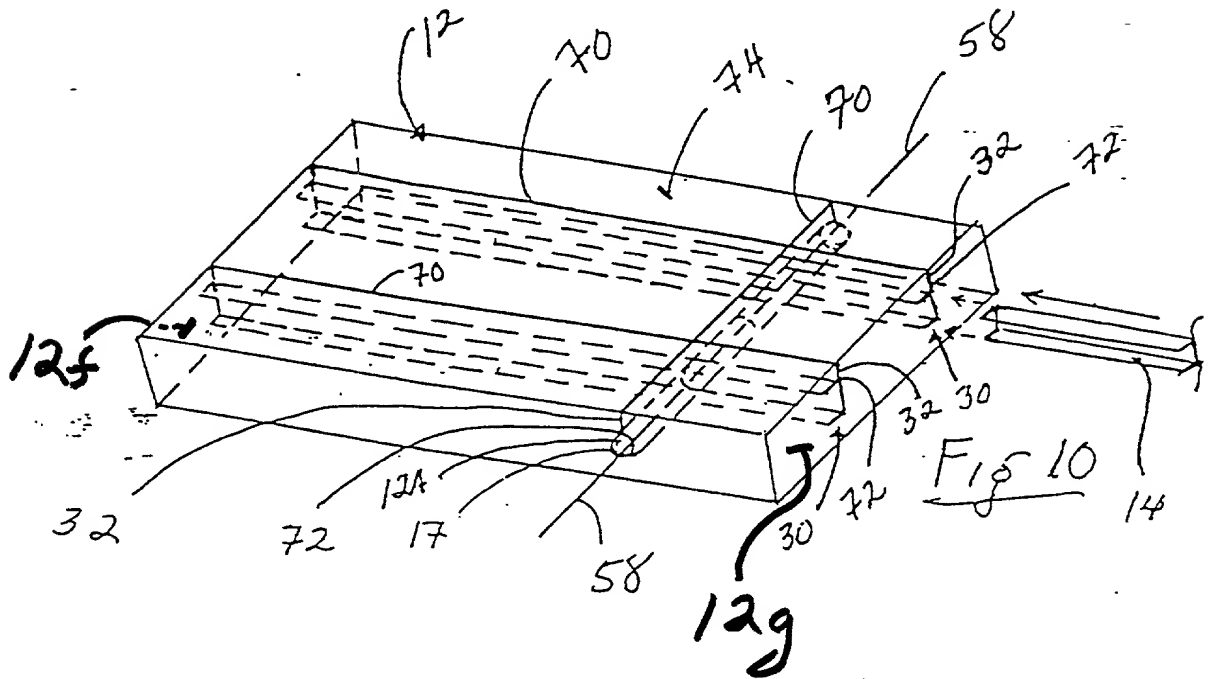
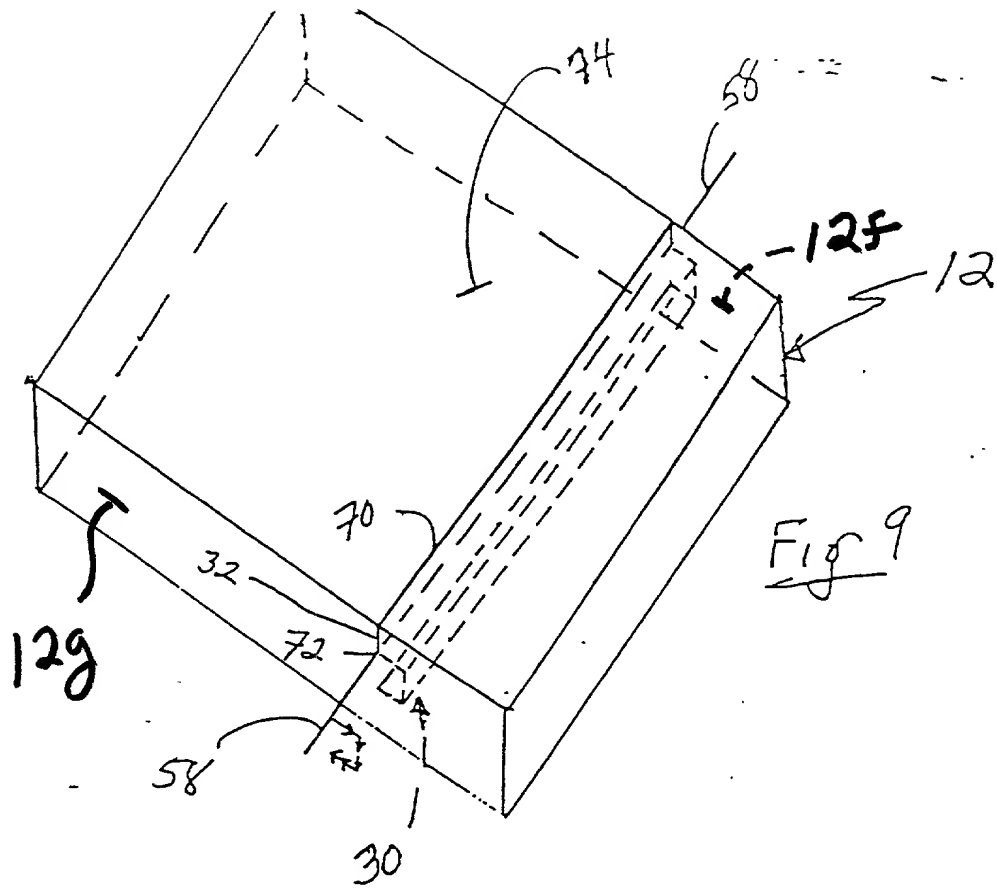
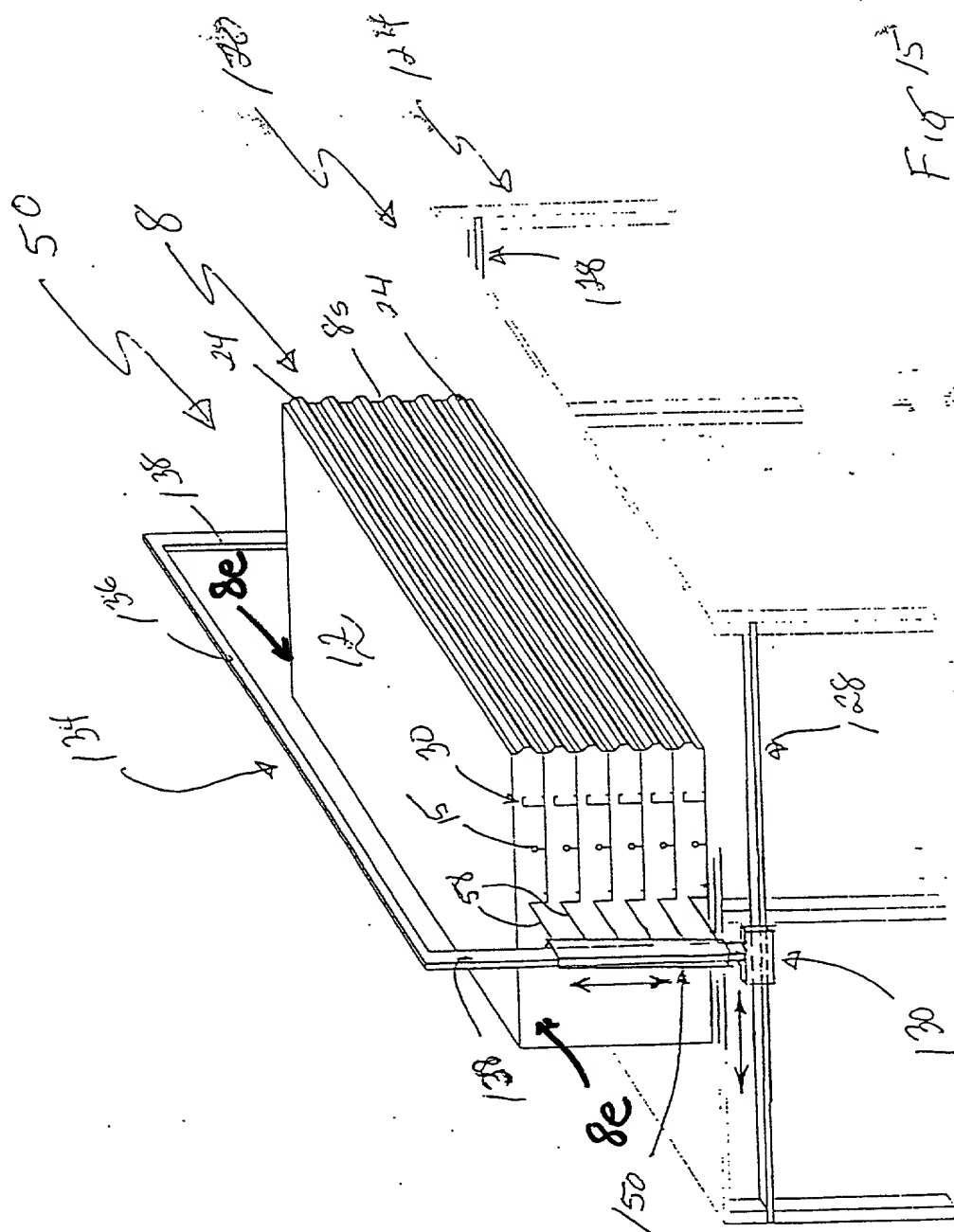


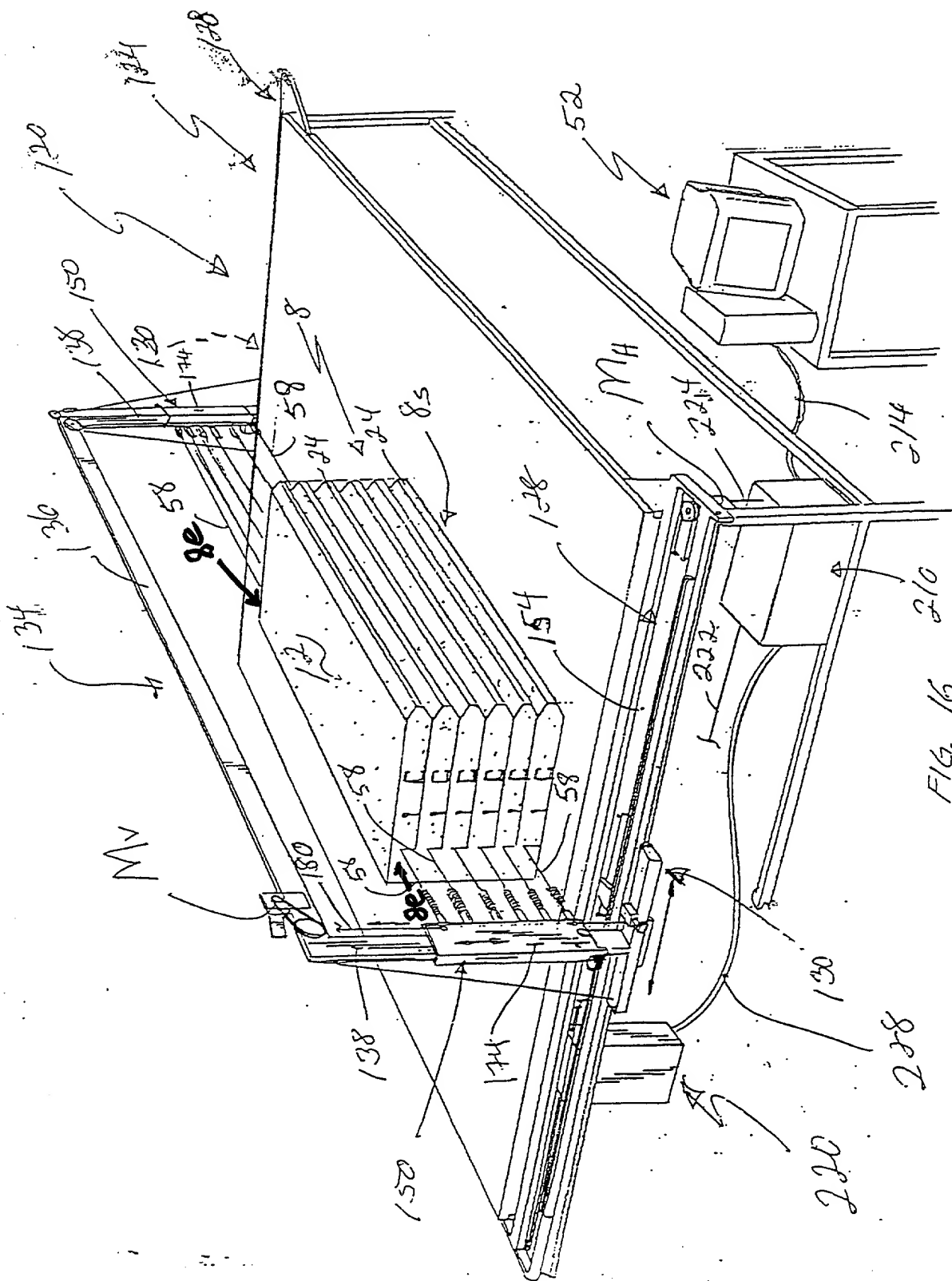
Fig 6

Sheet rock





File 157



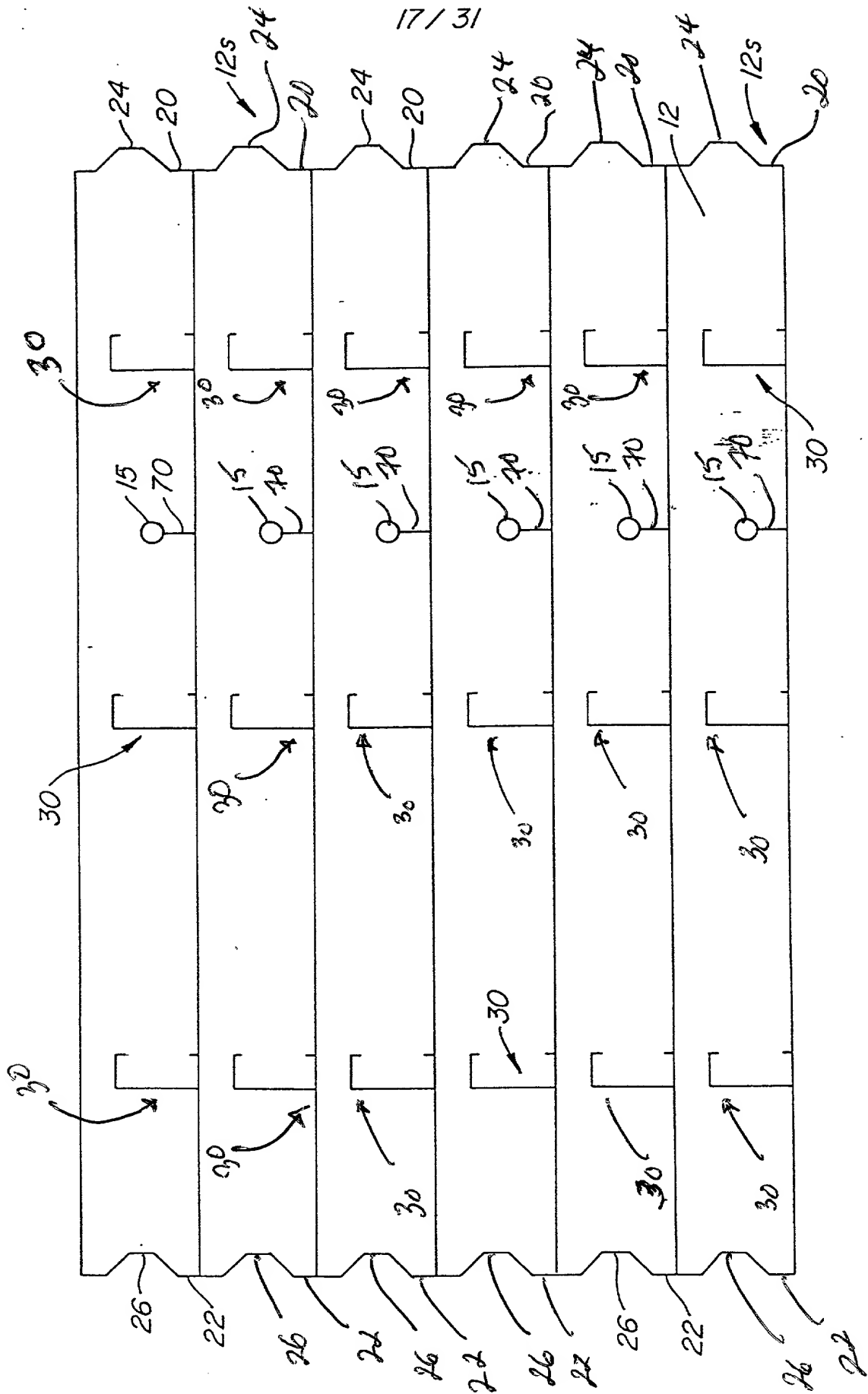
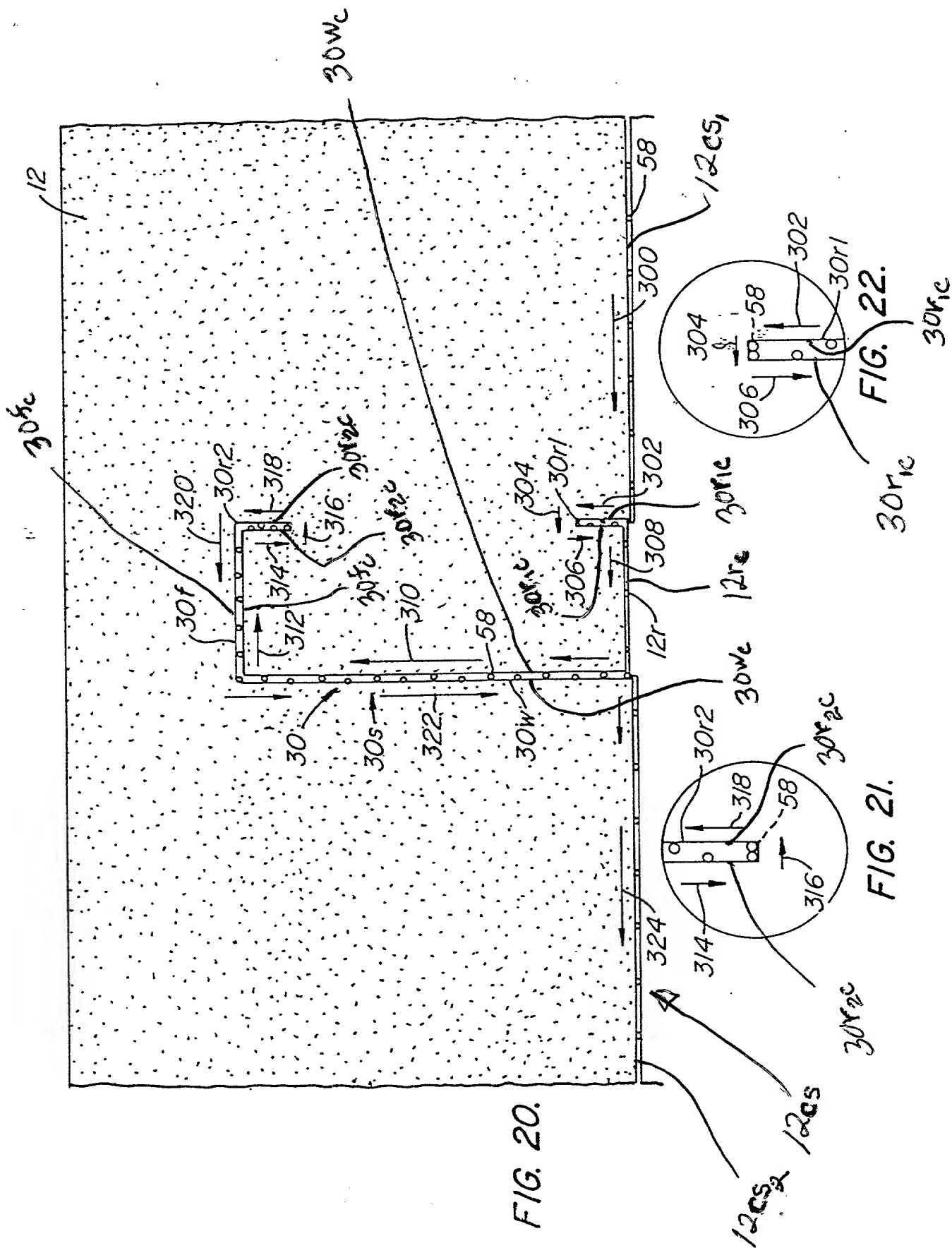
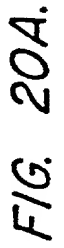


FIG. 19.





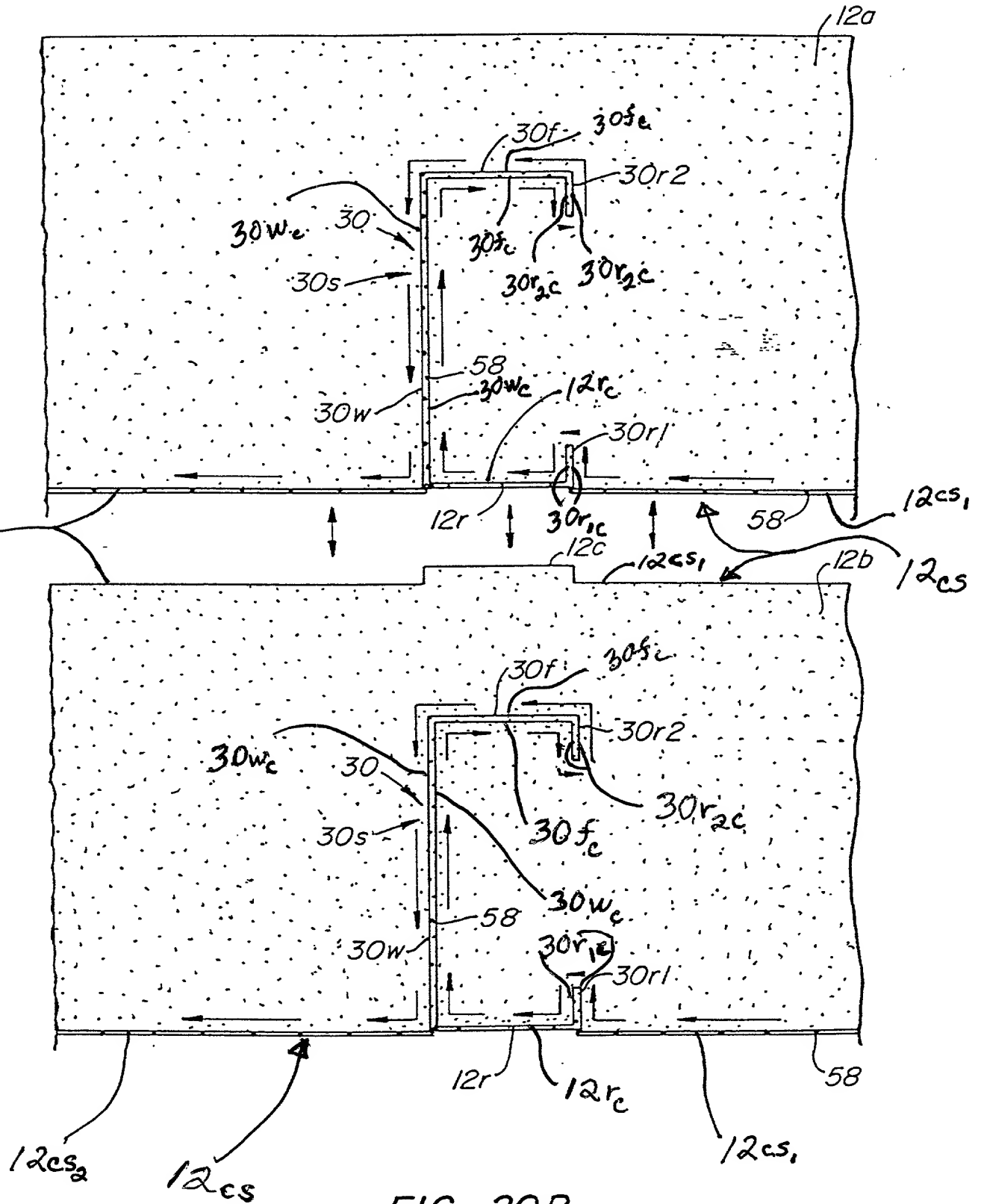
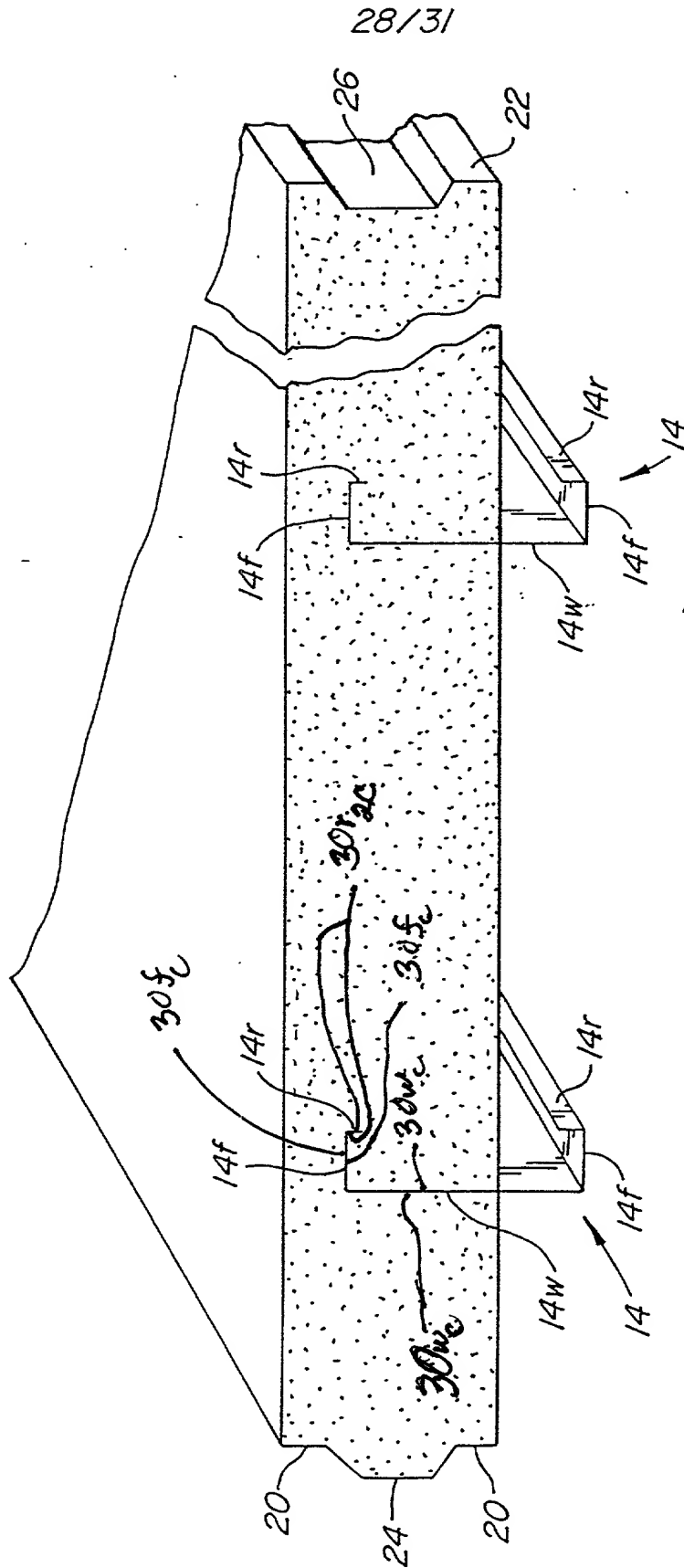


FIG. 20B.



DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I declare that:

My residence, post office address and citizenship are as stated below next to my name; I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural inventors are named below) of the subject matter which is claimed and for which a patent is sought on the invention entitled: **AN IMPROVED SYNTHETIC PANEL AND METHOD** the specification of which X is attached hereto or was filed on as Application No. and was amended on (if applicable).

I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above. I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56. I claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign applications(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed.

Prior Foreign Application(s)

Country	Application No.	Date of Filing	Priority Claimed Under 35 USC 119
			Yes <u> </u> No <u> </u>
			Yes <u> </u> No <u> </u>

I hereby claim the benefit under Title 35, United States Code §119(e) of any United States provisional application(s) listed below:

Application No.	Filing Date

I claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Application No.	Date of Filing	Status
08/556,265	November 13, 1995	<u> </u> Patented <u> x </u> Pending <u> </u> Abandoned
		<u> </u> Patented <u> </u> Pending <u> </u> Abandoned


POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

J. Georg Seka, Reg. No. 2,491
John W. Carpenter, Reg. No. 26,447

Send Correspondence to: John W. Carpenter TOWNSEND and TOWNSEND and CREW LLP Two Embarcadero Center, 8th Floor San Francisco, CA 94111-3834	Direct Telephone Calls to: (Name, Reg. No., Telephone No.) Name: John W. Carpenter Reg. No.: 26,447 Telephone: (415) 576-0200
---	--

Full Name of Inventor 1	Last Name LANAHAN	First Name KENNETH	Middle Name or Initial P.	
Residence & Citizenship	City 514 Ruddy Court, Troy	State/Foreign Country Illinois	Country of Citizenship U.S.A.	
Post Office Address	Post Office Address 514 Ruddy Court	City Troy	State/Country Illinois	Zip Code 62294
Full Name of Inventor 2	Last Name	First Name	Middle Name or Initial	
Residence & Citizenship	City	State/Foreign Country	Country of Citizenship	
Post Office Address	Post Office Address	City	State/Country	Zip Code
Full Name of Inventor 3	Last Name	First Name	Middle Name or Initial	
Residence & Citizenship	City	State/Foreign Country	Country of Citizenship	
Post Office Address	Post Office Address	City	State/Country	Zip Code

I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Signature of Inventor 1  Kenneth P. Lanahan	Signature of Inventor 2	Signature of Inventor 3
Date 1-4-98	Date	Date